APPENDIX A
Glossary

A.1 Glossary of Terms and Acronyms

GLOSSARY OF TERMS AND ACRONYMS[†]

Asymptomatic: Showing no symptoms of illness.

Attack rate: The occurrence of disease observed among a defined population over a limited period of time.

Bacterium: A one-celled living microorganism that can cause foodborne infections and intoxications.

Bare hand contact: Having bare hands in direct contact with prepared or ready-to-eat food items.

Biological hazard[*]: A bacterial, viral, or parasitic agent that may make food unsafe to eat. Often associated with microorganisms naturally found in raw meat and poultry products or microorganisms introduced during processing of meat and poultry products.

Carrier: Individuals who harbor an infectious agent but are asymptomatic.

Case definition: A set of criteria for determining who should be classified as a case. The definition is comprised of clinical information and should include information related to time, place, and person.

Case: A person with the particular item of interest or disease.

Case-control study: An observational, analytical study in which individuals are not part of a well-defined population. Inclusion into the study is dependent upon the presence or absence of illness or disease.

Chemical hazard[*]: Chemicals that are naturally occurring in foods (i.e., aflatoxins, mucotoxins, and shellfish toxins) or added during the processing of foods. Intentional or unintentionally added chemicals may include components of animal feed or drinking water, animal drugs, pesticides, food ingredients themselves, or chemicals used in the processing establishment, like lubricants, cleaners, paints, and coatings.

Cohort study: An observational, analytical study involving a well-defined group of individuals. Inclusion into the study is dependent upon a common experience of exposure.

Common-source outbreak: A type of outbreak that occurs when individuals are exposed to some point-source of infection at the same time.

[†] Many definitions were taken from (1) Last, JM ed. *A Dictionary of Epidemiology*, 3rd ed. New York: Oxford U. Press, 1995 and (2) Chin, J ed. *Control of Communicable Diseases Manual*, 17th ed. Washington DC: American Public Health Association, 2000.

[*] USDA – FSIS. *Guidebook for the Preparation of HACCP Plans.* September 1999.

Confidence intervals: A range of numbers that indicates how "confident" one can be that the observed number actually lies within the range.

Confidentiality: The obligation to not disclose identifying information unless needed to protect the public's health.

Confirmed disease outbreak: A foodborne disease outbreak in which laboratory analysis of appropriate specimens identifies a causative agent and epidemiologic analysis implicates the food as the source of the illness. [NOTE: Positive laboratory identification of the disease-causing organism is not necessary to determine that a foodborne disease outbreak has occurred nor is this identification needed to begin investigation.]

Consumer: A person who is a member of the public, takes possession of food, is not functioning in the capacity of an operator of a food establishment or food processing plant, and does not offer the food for resale.

Continual-source outbreak: A type of outbreak that occurs when a source remains contaminated and exposure and illness continues.

Control: In a case-control study, a person without illness or disease.

Control measure[‡]: Any action or activity that can be used to prevent, eliminate, or reduce a significant hazard.

Control point[‡]: Any step at which biological, chemical, or physical factors can be controlled.

Corrective action[‡]: Procedures that are initiated when a deviation or problem in the flow of food preparation is identified.

Critical limit[‡]: The maximum and/or minimum value at which a biological, chemical, or physical hazard must be controlled at a given critical control point to ensure food safety.

Critical control point (CCP)[‡]: A step at which control can be applied to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Cross-contamination: The transfer of pathogens from one food item to another food item during food preparation through cooking equipment, utensils, and the hands of food handlers.

Deviation[‡]: Failure to meet a critical limit.

Epidemic curve (epi curve): A histogram or graph that provides a visual depiction of the outbreak over time.

Epidemiology: The study of the distribution and determinants of health-related states or events within a specific population, and the application of this study to control health problems.

FAT TOM: Conditions that favor the growth of foodborne microorganisms within the environmental setting, specifically food, acidity, time, temperature, oxygen, and moisture.

Fecal-oral route: The ingestion of stool from an infected person or animal through food, liquids or direct contact.

Food establishment: An operation that stores, prepares, packages, serves, vends, or otherwise provides food for human consumption. Food establishments include a restaurant; satellite or catered feeding location; catering operation if the operation provides food directly to a consumer or to a conveyance used to transport people; market; vending location; conveyance used to transport people; institution; or food bank.

Food handler: A person who directly handles or prepares food.

Food processing plant: A commercial operation that manufactures, packages, labels, or stores food for human consumption and does not provide food directly to a consumer.

Foodborne disease outbreak (FBDO): (1) Two or more individuals (from different households) who experience a similar illness after eating a common food or different food from a common place or (2) an unexplained, unexpected increase of a similar illness, and food is a likely source.

Foodborne illness: A disease acquired through eating or drinking contaminated food or liquids.

Foodborne infection: A disease caused by consuming food or liquids contaminated with bacteria, viruses, or parasites.

Foodborne intoxication: A disease caused by consuming food or liquids contaminated with toxins.

Gastroenteritis: Inflammation of the stomach and intestines.

HACCP[‡]: Hazard Analysis Critical Control Point. A science-based, systematic approach of identifying, evaluating, and controlling food safety hazards.

HACCP plan[‡]: A written documentation of food processing and handling procedures that is based upon the HACCP principles.

HACCP system[‡]: A HACCP plan in operation. The implementation of a HACCP plan.

Hazard: A biological, chemical, or physical agent that may cause foodborne illness.

[‡] FDA. *HACCP: A State-of-the-Art Approach to Food Safety*. http://www.cfsan.fda.gov/~lrd/bghaccp.html.

Highly susceptible population: A group of persons who are more likely than other populations to experience foodborne disease because they are immunocompromised or older adults and in a facility that provides health care or assisted living services, such as a hospital or nursing home; or preschool age children in a facility that provides custodial care, such as a day care center.

Hypothesis: An educated guess based on observations.

Incubation period: The interval from the time an individual is infected to the time when symptoms first appear.

Jaundice: Yellowing of the skin and eyes as a result of accumulation of bile pigment in the blood.

Line listing: A table that summarizes information about persons associated with an outbreak. Information often includes identifying information, demographics, clinical information, and exposure or risk factor information.

Notifiable disease: A disease that is required by law to be reported to the public health authority. See Appendix C for the list of notifiable diseases in Kansas.

Odds ratio (OR): The ratio of the odds. This measure of association is used to determine whether a specific exposure is associated with a certain disease.

Onset: The date and time when clinical signs or symptoms first appear.

Outbreak: An unexpected, unexplained increase of disease occurring within a specific population at a given time and place.

Parasite: A single or multi-celled organism that can cause foodborne infections.

Pathogen: A disease-causing organism.

Person-to-person outbreak: See propagated-source outbreak.

Physical hazard[*]: A foreign material, such as glass, metal, or plastic, that may cause illness or injury

Point-source outbreak: See common-source outbreak.

Potentially Hazardous Food (PHF): Any food or food ingredient (natural or synthetic) that is capable of supporting rapid growth of microorganisms under certain temperatures. Examples include cooked or raw animal products, heat treated vegetables and starches, sprouts, and melons.

[*] USDA – FSIS. *Guidebook for the Preparation of HACCP Plans.* September 1999.

Propagated-source outbreak: A type of outbreak that occurs when infections is spread from one person to another via the fecal-oral route.

Public health surveillance: The routine collection, analysis, summarization, and dissemination of data for the purpose of preventing and controlling the spread of disease.

Pulsed-field gel electrophoresis (PFGE): A laboratory method used to separate bacterial isolates into genetic fragments, thus forming a unique "DNA fingerprint".

***p*-value:** The probability that a difference observed could have occurred by chance alone.

Questionnaire: A predetermined set of questions used to collect data. The main components include identifying information, demographics, clinical information, exposure or risk factor information, and knowledge of illness in others.

Ready-to-eat food: A food item that can be consumed without further preparation. Examples include raw vegetables and fruits, deli meats, bread, and ice.

Recovery period: The period when symptoms decline and illness improves.

Relative risk or relative risk ratio (RR): The ratio of the attack rate for ill persons who were exposed and the attack rate for ill persons who were not exposed.

Reservoir: The source of infection for a susceptible host.

Retail food store: Any establishment or section of an establishment where food and food products are offered to the consumer and intended for off-premises consumption, including delicatessens that offer prepared food in bulk quantities only.

Risk factor: An attribute or exposure that is associated with an increased occurrence of disease or other health-related event or condition.

Spot map: A pictorial of the spatial distribution of illness within a specific setting or area.

Stool: Feces.

Toxin: A poison produced or released by certain bacteria that can cause foodborne intoxications.

Traceback: The method of tracing implicated food items backwards through the production and distribution chain to identify the contaminated item and remove it from the food market.

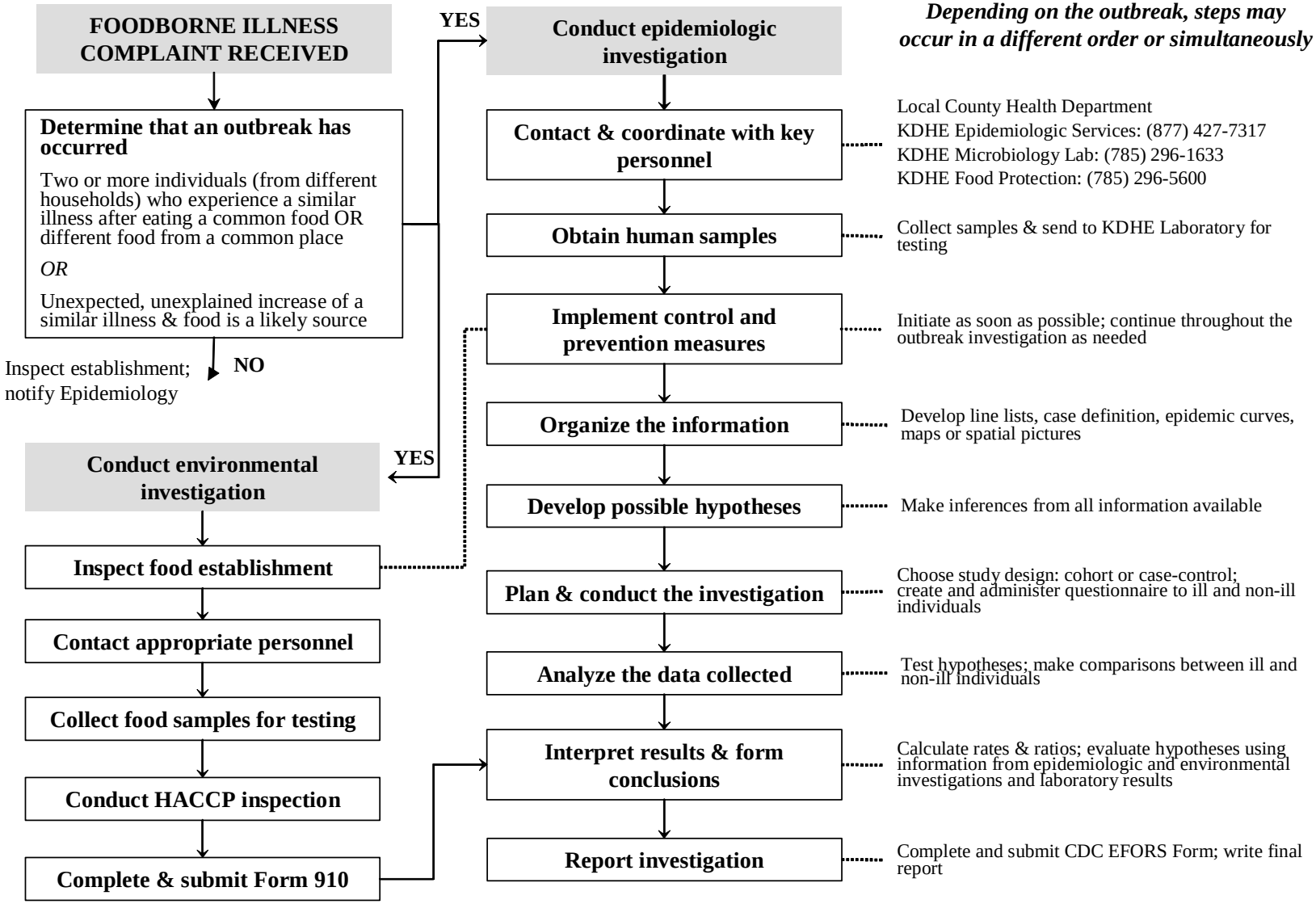
Verification‡: Those activities, other than monitoring, that determine the validity of the HACCP plan and that the system is operating according to the plan.

Virus: A minute organism that can cause foodborne infections.

APPENDIX B
Flowchart and Checklist

B.1 Foodborne Outbreak Investigation Flowchart
B.2 Foodborne Disease Outbreak Checklist

FOODBORNE OUTBREAK INVESTIGATION FLOWCHART



Foodborne Disease Outbreak Checklist for Local Health Departments

The following checklist provides general steps that infection control nurses or administrators should take during a foodborne disease outbreak investigation.

- ❑ Confirm that a foodborne disease outbreak has occurred. Does it meet the definition for a foodborne disease outbreak?
  - Use "Potential Foodborne Outbreak Worksheet" as a helpful tool

- ❑ Contact and coordinate with KDHE at (877) 427-7317 for all outbreaks.

- ❑ Contact food inspector, if food service establishment is involved.

- ❑ Provide stool sample kits to ill persons (5-8 persons) and send samples to KDHE Laboratory.
  - Have stool kits available for distribution
  - Submit human and food samples to KDHE Laboratory using "Universal Form"

- ❑ Implement prevention and control measures.
  - Give special restriction or exclusion instructions to ill persons who are food handlers, are associated with day care, or involved with direct patient care.
  - Emphasize good handwashing.

- ❑ Conduct case finding among other family members, others attending common functions

- ❑ Continue coordination with KDHE and food inspector assigned to outbreak.
  - Assist in the administration of questionnaires

- ❑ If disease is a notifiable disease, report information to KDHE via HAWK, fax, or mail.

- ❑ Write final report, if resources permit. At the minimum, provide lead investigator with pertinent information to write the final report.

APPENDIX C
Forms

C.1 Potential Enteric Outbreak Worksheet

POTENTIAL ENTERIC OUTBREAK WORKSHEET

(For use as a tool — submission to KDHE is not necessary)

Date outbreak reported: _____/_____/_____ **Investigator's Initials:** _____

CALLER INFORMATION

Name: _____

Agency: _____

City: _____

County: _____

Contact Phone: (____)_____

Caller Type:
- □ Food Inspector
- □ Laboratorian
- □ Nurse
- □ Physician
- □ Private Citizen
- □ Other _____

Suspected Type of Outbreak Reported:
- □ Foodborne
- □ Person-to-person
- □ Waterborne

ILLNESS INFORMATION

Date First Person Became Ill: ____/____/____

Time of First Illness: _____ AM PM

# of Ill Individuals Reported: _____

Total # of Individuals in Group: _____

Symptoms Reported:
- □ Watery Diarrhea
- □ Bloody Diarrhea
- □ Abdominal cramping
- □ Nausea
- □ Vomiting
- □ Fever
- □ Headache
- □ Dizziness
- □ Other _____

# of Individuals who:

Had doctor visits _____

Had ER visits _____

Were hospitalized _____

# of Stool Samples Collected To Date _____
(Note: Attempt to collect some samples if none already taken.)

EVENT INFORMATION

Date of First Known Exposure: ____/____/____

Time of First Exposure: _____ AM PM

Place of Exposure:
- □ Day care
- □ Nursing Home
- □ Office setting
- □ Private Residence
- □ Reception Hall
- □ Restaurant
- □ School
- □ Other _____

Name of Place: _____

City & County _____

If catered event:

Catering Company _____

City & County _____

If foodborne, other common meals shared:

1. _____
2. _____
3. _____

COMMENTS

_____

_____

_____

_____

_____

_____

_____

NEXT STEP: Contact KDHE Epidemiologic Services of potential outbreak *and/or* your regional medical investigator at (877) 427-7317

C.2 Seven-day Enteric Questionnaire

Kansas Department of Health and Environment

7-day Enteric Exposure Questionnaire

Diagnosis_____ Date_____

Last Name_____ First Name_____ Phone number_____

Address_____ City_____ State___ Zip code_____

Date of birth_____ Sex____ Occupation_____

Enrolled in daycare (children)? Y N Daycare Name_____

First symptom _____ Date _____ Time _____ AM PM

Indicate all symptoms:

Diarrhea (more than 3 loose stools in a 24 hour period): Y N

Bloody diarrhea: Y N Number stools/24 hours: _____

Stomach ache: Y N Nausea: Y N

Vomiting: Y N Muscle aches/pains: Y N

Fever: Y N Highest temperature_____

Other symptoms?_____

Did you completely recover? Y N If so: Date: _____ Time _____ AM PM

Did you see or contact a doctor? Y N Name of doctor _____

Was a stool specimen collected? Y N Were you hospitalized? Y N

Did anyone else (in your family or close personal contacts) have the same symptoms? Y N

Relationship: _____ Date of illness: _____

In the 7 days prior to illness, did you have contact with any of the following animals?

Chicks? Y N Ducklings? Y N

Other birds? Y N Specify _____

Reptiles (turtles, snakes, lizards, iguanas, etc)? Y N

Specify _____

Other pets or animals? Y N Specify_____

If any of these animals are your pets, indicate when and where purchased:

Store_____ City_____ Date_____

Live or work on a farm? Y N Primary kinds of livestock? _____

In the 7 days prior to illness, did any of your pets or livestock have diarrhea or scouring? Y N

Did you go swimming in the 7 days prior to illness? Y N

If so, did you swim in a: Chlorinated pool? Y N
Wading pool? Y N
River, Lake, or Pond? Y N
Name and/or location of swimming facility _____

Did you travel in the 7 days prior to illness? Y N

Specify: Place _____ Dates _____

Place _____ Dates _____

Were you taking antibiotics at anytime in the 14 days prior to illness? Y N

Name of antibiotic:_____ Reason for taking antibiotic: _____

_____ Dates taken:_____ to_____

Name of antibiotic:_____ Reason for taking antibiotic: _____

_____ Dates taken:_____ to_____

In the 7 days prior to illness, did you attend any parties, fairs, carnivals, family/social gatherings, or other events at which food was provided? Y N (List additional information on reverse)

Name/description of event _____ City _____ Date _____

Foods eaten _____

What is the source of your drinking water? (indicate all that apply)

Public water system? Y N Name: _____
Private well? Y N
Bottled Water? Y N Brand name: _____

Did you eat at any restaurants in the 7 days before becoming ill? Y N

Please list restaurants to the best of your recollection:

1. Name_____ City_____ Date_____

Foods eaten _____

2. Name_____ City_____ Date_____

Foods eaten_____

(List additional restaurant information on reverse)

Indicate which of the below foods you eat routinely. To the best of your recollection, also provide the usual brand names and the store name(s) and location(s) where you usually purchase them:

Chicken	Y	N	Brand_____	Store name _____ City_____
Hamburger	Y	N	Brand_____	Store name _____ City_____
Sausage	Y	N	Brand_____	Store name _____ City_____
Hot Dogs	Y	N	Brand_____	Store name _____ City_____
Lunch Meat	Y	N	Brand_____	Store name _____ City_____
Eggs	Y	N	Brand_____	Store name _____ City_____
Milk (Raw)	Y	N	Supplier_____	City_____
Milk (Past.)	Y	N	Brand_____	Store name _____ City_____
Fresh Juice	Y	N	Brand_____	Store name _____ City_____
Fresh Berries	Y	N	Brand_____	Store name _____ City_____
Fresh Melon	Y	N	Brand_____	Store name _____ City_____
Other Fresh Fruit	Y	N	Brand_____	Store name _____ City_____
Lettuce	Y	N	Brand_____	Store name _____ City_____
Alfalfa Sprouts	Y	N	Brand_____	Store name _____ City_____
Other fresh vegetables	Y	N	Brand_____	Store name _____ City_____

Other foods which may have caused your illness?

Food Item _____ Brand_____ Store name _____ City_____

Food Item _____ Brand_____ Store name _____ City_____

Any other comments relative to your illness?_____

_____

_____

(Revised 02/2003)

C.2

C.3 Kansas Notifiable Disease Form

KANSAS NOTIFIABLE DISEASE FORM

Today's Date: ____ / ____ /____

Patient's Name: _____
Last First Middle

Day Phone: _____ **Evening Phone:** _____

Residential Address: _____

City: _____ **Zip:** _____ **County:** _____

Ethnicity: Hispanic or Latino Not Hispanic or Latino Unknown

Race: American Indian/Alaska Native Asian Black or African American
Native Hawaiian or Other Pacific Islander White Unknown
(Circle all that apply)

Sex: M F **Date of Birth:** _____ / _____ / _____ **Age if DOB unknown:** _____

Disease Name: _____

Symptoms:
Onset: ___ / ___ /____ **State the 3 most prominent symptoms**:

Symptom 1:_____ Symptom 2:_____ Symptom 3:_____

Outbreak associated? Y N Died? Y N

Institutional Residence? None Nursing Home Correctional Residential Hospital Psych

Physician Name: _____ **Physician Phone**:_____

Laboratory Information:

Specimen Collection Date: _____ / _____ / _____ Date Reported To You: _____ / _____ / _____

Name of Test Performed: _____ Results of Test: _____

Name of Laboratory: _____ Laboratory Results Attached? Y N

Treatment Information:

Date of Treatment: _____ / _____ / _____ Treatment Type and Dosage: _____
Treatment Status: Complete On-going Discontinued

Name of person reporting: _____ **Phone:** _____

Comments: _____

Mail reports to your local health department or to: BEDP – Disease Surveillance, 1000 SW Jackson, Suite 210, Topeka, KS 66612-1274. Reports can also be ***faxed toll free*** to: 1-877-427-7318. (Rev. 04/2004)

2004 REPORTABLE DISEASES IN KANSAS for health care providers, hospitals, and laboratories
(K.S.A. 65-118, 65-128, 65-6001 through 65-6007, K.A.R. 28-1-2, 28-1-4, and 28-1-18)

☎ ***Bold*** --Telephone report within four hours of *suspect* or *confirmed* cases to KDHE toll free at **1-877-427-7317**.

ⓘ **Isolates must be sent to:** Division of Health and Environmental Laboratories
Forbes Field, Building #740, Topeka, KS 66620-0001
Phone: (785) 296-1636

☎ DISEASES REQUIRING SPECIAL ATTENTION ☎

Anthrax ☎
Botulism ☎
Cholera ☎
Measles (rubeola) ☎
Meningitis, bacterial ☎
Meningococcemia ⓘ☎
Mumps ☎
Pertussis (whooping cough) ☎
Plague ☎
Poliomyelitis ☎
Q Fever ☎
Rabies, human and animal ☎
Rubella, including congenital rubella syndrome ☎
Severe Acute Respiratory Syndrome (SARS) ⓘ☎
Smallpox ☎
Tuberculosis, active disease ⓘ ☎
Viral hemorrhagic fever ☎
Escherichia coli O157:H7
(and other enterohemorrhagic, enteropathogenic and enteroinvasive *E. coli)* ⓘ
Salmonellosis, including typhoid fever ⓘ
Shigellosis ⓘ
Streptococcal invasive disease, Group A from *Streptococcus* or *Streptococcus pneumoniae* ⓘ

Acquired Immune Deficiency Syndrome (AIDS)
Amebiasis
Anthrax ☎
Botulism ☎
Brucellosis
Campylobacter infections
Chancroid
Chlamydia trachomatis genital infection
Cholera ☎
Cryptosporidiosis
Cyclospora infection
Diphtheria
Ehrlichiosis
Encephalitis, infectious (includes West Nile virus)
Escherichia coli O157:H7
(and other enterohemorrhagic, enteropathogenic and enteroinvasive *E. coli)* ⓘ
Giardiasis
Gonorrhea
Haemophilus influenza, invasive disease
Hantavirus Pulmonary Syndrome
Hemolytic uremic syndrome, postdiarrheal
Hepatitis, viral (acute and chronic)
Hepatitis B during pregnancy
Human Immunodeficiency Virus (HIV) (includes Viral Load Tests)
Legionellosis
Leprosy (Hansen disease)
Listeriosis
Lyme disease
Malaria
Measles (rubeola) ☎
Meningitis, arboviral (includes West Nile virus)
Meningitis, bacterial ☎
Meningococcemia ⓘ☎
Mumps ☎
Pertussis (whooping cough) ☎
Plague ☎
Poliomyelitis ☎
Psittacosis
Q Fever ☎
Rabies, human and animal ☎
Rocky Mountain Spotted Fever
Rubella, including congenital rubella syndrome ☎
Salmonellosis, including typhoid fever ⓘ
Severe Acute Respiratory Syndrome (SARS) ⓘ☎
Shigellosis ⓘ
Smallpox ☎
Streptococcal invasive disease, Group A from *Streptococcus* or *Streptococcus pneumoniae* ⓘ
Syphilis, including congenital syphilis
Tetanus
Toxic shock syndrome, streptococcal and staphylococcal
Trichinosis
Tuberculosis, active disease ⓘ☎
Tuberculosis, latent infection
Tularemia
Varicella (chickenpox)
Viral hemorrhagic fever ☎
Yellow fever

In addition, laboratories must report:

- Viral load results of reportable diseases
- ALL blood lead levels, as of 12/2002 (KCLPPP/ABLES)
- CD4+ T-lymphocyte count < 500/ µl or CD4+ T-lymphocytes <29% of total lymphocytes

Outbreaks, unusual occurrence of any disease, exotic or newly recognized diseases, and suspect acts of terrorism should be reported within 4 hours by telephone to the Epidemiology Hotline: 1-877-427-7317

Mail or fax reports to your local health department or to:
Bureau of Epidemiology & Disease Prevention - Disease Surveillance, 1000 SW Jackson, Suite 210 Topeka, KS 66612-1274
Fax: 1-877-427-7318 (toll free)

C.4 CDC “Investigation of a Foodborne Outbreak” Form and Instructions

FORM APPROVED
OMB NO.0920-0004

INVESTIGATION OF A FOODBORNE OUTBREAK

This form is used to report foodborne disease outbreak investigations to CDC. A foodborne outbreak is defined as the occurrence of **two or more cases** of a similar illness resulting from the ingestion of a common food in the United States. This form has **two** parts: Part 1 asks for the minimum data needed and Part 2 asks for additional information. For this investigation to be counted in the CDC annual summary, Part 1 must be completed. **We encourage you to complete as much of Part 1 and Part 2 as you can.**

CDC USE ONLY
__ __-__ __ __ __ __ __

STATE USE ONLY
_____

Part 1: Required Information

1. Location of Exposure:

State: ___ ___
☐ Multi-state exposure

County: _____
☐ Multi-county exposure

List other states/counties in Comments, bottom of this page

2. Dates:

Date first case became ill: ___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

Date of first known exposure: ___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

Date of last known exposure: ___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

3. Numbers of Cases Exposed:

Lab-confirmed cases: _____ *(A)*

Probable cases: _____ *(B)*

Estimated total ill: _____
(If greater than sum of A+B)

4. Approximate Percentage of Total Cases in Each Age Group:

<1 year: _____% 20-49 yrs: _____%

1-4 yrs: _____% ≥ 50 yrs: _____%

5-19 yrs: _____%

5. Sex: (Estimated percent of total cases)

Male: _____ %

Female: _____ %

6. Investigation Methods: (Check all that apply)

☐ Interviews of cases only
☐ Case-control study
☐ Cohort study
☐ Food preparation review
☐ Food product traceback
☐ Investigation at factory or production plant
☐ Investigation at original source (farm, marine estuary, etc.)
☐ Environment / food sample cultures

7. Implicated Food(s): (based on Reasons listed in Item 15 on page 3)

_____
_____
_____
_____
_____

☐ Could not be determined

8. Etiology: (Name the bacteria, virus, parasite, or toxin. If available, include details such as phage type, virulence factors, molecular fingerprinting, antibiogram, metabolic profile.

Etiology	**Serotype** (if avail.)	**Other Characteristics** (if avail.)

☐ Confirmed*
☐ Suspected

☐ Unknown etiology
☐ Multiple etiologies (list in Comments)

Isolated/identified from (check all that apply)
☐ Patient specimen(s)
☐ Food specimen(s)
☐ Environment specimen(s)
☐ Food Worker specimen(s)

* see criteria at http://www.cdc.gov/ncidod/dbmd/outbreak/ or MMWR2000/Vol 49/SS-1/Appendix B

9. Contributing Factors: (See list on page 2, check all that apply)

☐ Contributing factors unknown

Contamination Factor:
☐ C1 ☐ C2 ☐ C3 ☐ C4 ☐ C5 ☐ C6 ☐ C7 ☐ C8 ☐ C9
☐ C10 ☐ C11 ☐ C12 ☐ C13 ☐ C14 ☐ C15 *(describe in Comments)* ☐ N/A

Proliferation/Amplification Factor (bacterial outbreaks only):
☐ P1 ☐ P2 ☐ P3 ☐ P4 ☐ P5 ☐ P6 ☐ P7 ☐ P8 ☐ P9
☐ P10 ☐ P11 ☐ P12 *(describe in Comments)* ☐ N/A

Survival Factor (microbial outbreaks only):
☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 *(describe in Comments)* ☐ N/A

Was food-worker implicated as the source of contamination? ☐ Yes ☐ No
If yes, please check ***only one*** of following:
☐ laboratory *and* epidemiologic evidence
☐ epidemiologic evidence (w/o lab confirmation)
☐ lab evidence (w/o epidemiologic confirmation)
☐ prior experience makes this the likely source *(please explain in Comments)*

10. Agency reporting this outbreak:

_____

Contact Person:

NAME: _____
TITLE: _____
PHONE NO: _____
FAX NO: _____
E-MAIL: _____

Date of completion of this form:

___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

☐ **Initial Report**
☐ **Updated Report**
☐ **Final Report**
☐ **Additional data suggests this is not a foodborne outbreak**

Comments: _____

The following codes are to be used to fill out Part 1 (question 9) and Part 2 (question 15).

Contamination Factors:[1]

C1 - Toxic substance part of tissue (e.g., ciguatera)
C2 - Poisonous substance intentionally added (e.g., cyanide or phenolphthalein added to cause illness)
C3 - Poisonous or physical substance accidentally/incidentally added (e.g., sanitizer or cleaning compound)
C4 - Addition of excessive quantities of ingredients that are toxic under these situations (e.g., niacin poisoning in bread)
C5 - Toxic container or pipelines (e.g., galvanized containers with acid food, copper pipe with carbonated beverages)
C6 - Raw product/ingredient contaminated by pathogens from animal or environment (e.g., *Salmonella enteriditis* in egg, Norwalk in shellfish, *E. coli* in sprouts)
C7 - Ingestion of contaminated raw products (e.g., raw shellfish, produce, eggs)
C8 - Obtaining foods from polluted sources (e.g., shellfish)
C9 - Cross-contamination from raw ingredient of animal origin (e.g., raw poultry on the cutting board)
C10 - Bare-handed contact by handler/worker/preparer (e.g., with ready-to-eat food)
C11 - Glove-handed contact by handler/worker/preparer (e.g., with ready-to-eat food)
C12 - Handling by an infected person or carrier of pathogen (e.g., *Staphylococcus*, *Salmonella*, Norwalk agent)
C13 - Inadequate cleaning of processing/preparation equipment/utensils – leads to contamination of vehicle (e.g., cutting boards)
C14 - Storage in contaminated environment – leads to contamination of vehicle (e.g., store room, refrigerator)
C15 - Other source of contamination (*please describe in Comments*)

Proliferation/Amplification Factors:[1]

P1 - Allowing foods to remain at room or warm outdoor temperature for several hours (e.g., during preparation or holding for service)
P2 - Slow cooling (e.g., deep containers or large roasts)
P3 - Inadequate cold-holding temperatures (e.g., refrigerator inadequate/not working, iced holding inadequate)
P4 - Preparing foods a half day or more before serving (e.g., banquet preparation a day in advance)
P5 - Prolonged cold storage for several weeks (e.g., permits slow growth of psychrophilic pathogens)
P6 - Insufficient time and/or temperature during hot holding (e.g., malfunctioning equipment, too large a mass of food)
P7 - Insufficient acidification (e.g., home canned foods)
P8 - Insufficiently low water activity (e.g., smoked/salted fish)
P9 - Inadequate thawing of frozen products (e.g., room thawing)
P10 - Anaerobic packaging/Modified atmosphere (e.g., vacuum packed fish, salad in gas flushed bag)
P11 - Inadequate fermentation (e.g., processed meat, cheese)
P12 - Other situations that promote or allow microbial growth or toxic production (*please describe in Comments*)

Survival Factors:[1]

S1 - Insufficient time and/or temperature during initial cooking/heat processing (e.g., roasted meats/poultry, canned foods, pasteurization)
S2 - Insufficient time and/or temperature during reheating (e.g., sauces, roasts)
S3 - Inadequate acidification (e.g., mayonnaise, tomatoes canned)
S4 - Insufficient thawing, followed by insufficient cooking (e.g., frozen turkey)
S5 - Other process failures that permit the agent to survive (*please describe in Comments*)

Method of Preparation:[2]

M1 - Foods eaten raw or lightly cooked (e.g., hard shell clams, sunny side up eggs)
M2 - Solid masses of potentially hazardous foods (e.g., casseroles, lasagna, stuffing)
M3 - Multiple foods (e.g., smorgasbord, buffet)
M4 - Cook/serve foods (e.g., steak, fish fillet)
M5 - Natural toxicant (e.g., poisonous mushrooms, paralytic shellfish poisoning)
M6 - Roasted meat/poultry (e.g., roast beef, roast turkey)
M7 - Salads prepared with one or more cooked ingredients (e.g., macaroni, potato, tuna)
M8 - Liquid or semi-solid mixtures of potentially hazardous foods (e.g., gravy, chili, sauce)
M9 - Chemical contamination (e.g., heavy metal, pesticide)
M10 - Baked goods (e.g., pies, eclairs)
M11 - Commercially processed foods (e.g., canned fruits and vegetables, ice cream)
M12 - Sandwiches (e.g., hot dog, hamburger, Monte Cristo)
M13 - Beverages (e.g., carbonated and non-carbonated, milk)
M14 - Salads with raw ingredients (e.g., green salad, fruit salad)
M15 - Other, does not fit into above categories *(please describe in Comments)*
M16 - Unknown, vehicle was not identified

[1] Frank L. Bryan, John J. Guzewich, and Ewen C. D. Todd. Surveillance of Foodborne Disease III. Summary and Presentation of Data on Vehicles and Contributory Factors; Their Value and Limitations. Journal of Food Protection, 60; 6:701-714, 1997.
[2] Weingold, S. E., Guzewich JJ, and Fudala JK. Use of foodborne disease data for HACCP risk assessment. Journal of Food Protection, 57; 9:820-830, 1994.

Part 2: Additional Information (Please complete as much as possible)

11. Numbers of:

OUTCOME / SYMPTOM	**Cases** with **Outcome / Symptom**	**Total** cases for whom you have information available
Healthcare Provider Visit		
Hospitalization		
Death		
Vomiting		
Diarrhea		
Bloody stools		
Feverish		
Abdominal cramps		
*		
*		
*		
*		

12. Incubation Period:

(circle appropriate units)

Shortest: _____ (Hours, days)

Longest: _____ (Hours, days)

Median: _____ (Hours, days)

☐ Unknown

13. Duration of Acute Illness Among Those Who Recovered:

(circle appropriate units)

Shortest: _____ (Hours, days)

Longest: _____ (Hours, days)

Median: _____ (Hours, days)

☐ Unknown

* Use the following terms, if appropriate, to describe other common characteristics of cases:

anaphylaxis	descending paralysis	myalgia
arthralgia	flushing	paresthesia
bradycardia	headache	septicemia
bullous skin lesions	hemolytic uremic syndrome (HUS)	sore throat
bradycardia	hypotension	tachycardia
cough	itching	thromobocytopenia
coma	jaundice	temperature reversal
diplopia	lethargy	urticaria
		wheezing

14. If Cohort Investigation Conducted:

Event-specific Attack Rate = _____ **/** _____ **x 100 =** _____ **%**

 # ill **total # of persons for whom you have illness info.**

15. Implicated Food(s): (Please provide known information.)

Name of Food	**Main Ingredients**	**Contaminated Ingredient**	**Reason(s) Suspected** (see below)	**Method of Preparation** (see list on page 2)
e.g., lasagna	*pasta, sauce, eggs, beef*	*eggs*	*4*	*M1*

☐ Food vehicle could not be determined

Reason Suspected (choose all that apply):

1 - Statistical evidence from epidemiological investigation
2 - Laboratory evidence (e.g., identification of agent in food)
3 - Compelling supportive information
4 - Other data (e.g., same phage type found on farm that supplied eggs)
5 - Specific evidence lacking but prior experience makes this likely source

16. Where was Food Prepared? (Check all that apply)

- ☐ Restaurant or deli
- ☐ Day care center
- ☐ School
- ☐ Church, temple, etc.
- ☐ Camp
- ☐ Caterer
- ☐ Grocery store
- ☐ Hospital
- ☐ Workplace cafeteria
- ☐ Nursing home
- ☐ Prison, jail
- ☐ Private home
- ☐ Picnic
- ☐ Fair, festival, other temporary/mobile service
- ☐ Contaminated food imported into U.S.
- ☐ Commercial product, served without further preparation
- ☐ Other (please describe)

_____

17. Where was Food Eaten? (Check all that apply)

- ☐ Restaurant or deli
- ☐ Day care center
- ☐ School
- ☐ Church, temple, etc.
- ☐ Camp
- ☐ Grocery Store
- ☐ Hospital
- ☐ Workplace cafeteria
- ☐ Nursing home
- ☐ Prison, jail
- ☐ Private home
- ☐ Picnic
- ☐ Fair, festival, or mobile location
- ☐ Other (please describe)

_____

18. Other Available Info:

- ☐ Unpublished agency report (please attach)
- ☐ Epi-Aid
- ☐ Publication (please reference)

_____

- ☐ Not available

19. Remarks: Briefly describe important aspects of the outbreak not covered above

(e.g., restaurant closure, product recall, immunoglobulin administration, economic impact, etc.)

_____

_____

_____

_____

_____

State Health Departments: Please FAX this document to Foodborne and Diarrheal Diseases, DBMD, CDC, at (404) 639-2205.

Guidelines for completing the form "Investigation of a Foodborne Outbreak"
Foodborne and Diarrheal Diseases Branch, DBMD, CDC
November 20, 2000

1. *Location of Exposure*
   Provide two-letter postal code of the state, and the full name of the county in which exposure took place. If exposure took place in multiple states or counties (such as with a commercial product), check the box provided and list other states or counties in the Comments section at the bottom of page 1.

2. *Dates*
   Indicate date that first known case patient became ill, and date that the first and last known exposure took place. If available, please send a copy of the epidemic curve along with this report form.

3. *Numbers Exposed in Your Jurisdiction*
   Provide number of laboratory-confirmed cases and number of presumptive cases. If applicable, also provide an estimate of the total number of ill persons if you suspect that this number exceeds the sum of the laboratory-confirmed and presumptive cases.

4. *Approximate Percentage of Total Cases in Each Age Group*
   This item seeks to identify unique patterns of age distribution for the outbreak, as well as to identify age groups most affected. Indicate the approximate percentage of all cases (lab-confirmed and presumptive) in the various age groups listed. Total should equal 100%.

5. *Sex*
   Estimate the percentage of males and females, using all cases (laboratory-confirmed and presumptive combined). Total should equal 100%.

6. *Investigation Methods*
   Check off all boxes that describe the methods used to investigate this outbreak.

7. *Implicated Food(s)*
   List the food item(s) implicated as a result of the investigation. Response to this question should match response to Item 15 on page 3, and should be based on one of the Reasons Suspected given in Item 15.

8. *Etiology*
   A. Identify the bacterium, virus, parasite, or toxin responsible for the outbreak. Please give as much detail as you have about the organism or toxin.
   B. Check the box to indicate whether the etiology is confirmed or suspected. "Confirmed" means that the criteria for confirmation of that etiology have been met. (Please visit our website at http://www.cdc.gov/ncidod/dbmd/outbreak/guide_fd.htm or see MMWR 2000 / Vol. 49 / ss-1 / Appendix B for confirmation criteria...).
   C. If more than one etiology was identified, please describe in the Comments section at the bottom of page 1.
   D. Check off all boxes that correspond to the specimen(s) from which the etiologic agent was

isolated or identified.

9. *Contributing Factors*
   A. Factors that contribute to the occurrence of outbreaks are classified according to contamination, survival, and proliferation. A factor should be checked only if the investigator has strong evidence that it actually occurred in this outbreak; just because a factor has been cited in similar outbreaks in the past does not mean it was involved in this outbreak. **Contamination factors** relate to how the agent got onto or into the food vehicle. **Proliferation factors** relate to how microbial agents were able to increase in numbers and/or produce toxic products prior to the vehicle being ingested. **Survival factors** refer to processes or steps that should have eliminated or reduced the agent but did not for the reason listed. Explanations and examples of the codes are provided on page 2 of the form. If the choice of "other" is made for any of the factors, please describe in the Comments section at the bottom of page 1.
   B. If one or more food workers are implicated as the source of contamination, please indicate what evidence was used to support this conclusion. The choice of "prior experience makes this the likely source" is provided for situations when conclusive laboratory and epidemiologic evidence is absent, but other factors may prompt the investigator to suspect the food worker(s). If a food worker is implicated in the absence of laboratory and/or epidemiologic evidence, please explain in the Comments section at the bottom of page 1.

10. *Agency reporting this outbreak*
    Indicate the agency reporting the outbreak and the relevant information for the person to contact with questions regarding the outbreak investigation. Provide today's date, and indicate whether this is the initial report of the outbreak investigation, or an update to a prior report.

11. *Numbers*
    For each outcome listed, provide the number of patients with the outcome, and the total number of patients for whom you have such outcome information available. If applicable, list other outcomes (and the relevant numbers) in the blank spaces provided. A list of possible outcomes is provided to the right of the table.

12. *Incubation Period*
    Indicate the shortest, longest, and median incubation period, and indicate whether each period is measured in hours or days.

13. *Duration of Acute Illness Among Those Who Recovered*
    Indicate the shortest, longest, and median duration of acute illness among those who recovered. Indicate whether each period is measured in hours or days.

14. *If Cohort Investigation Conducted*
    For cohort investigations only, report the attack rate. The formula is provided to aid in keeping our definition of attack rates consistent across investigations.

15. *Implicated Food(s)*
    Foods implicated in outbreaks may contain multiple ingredients, while often only one of these ingredients is the actual source of the etiologic agent. When possible, identification of an implicated ingredient(s) provide a basis for identifying ingredients that may be involved in other outbreaks. Please list the name of the food, the main ingredients, the contaminated ingredient, and the reason(s) for suspecting that the particular ingredient(s) was contaminated. Indicate method of preparation using list of codes found on page 2 of the form.

16. *Where was Food Prepared?*
    Indicate where food was prepared. Check all applicable boxes.

17. *Where was Food Eaten?*
    Indicate where suspected/implicated food was eaten. Check all applicable boxes.

18. *Other Available Information*
    Indicate what other sources of information are available for this outbreak. References should be cited for published papers.

19. *Remarks*
    Describe other important aspects of the outbreak that may not have been reported elsewhere in the form.

State health departments should fax form to the Foodborne and Diarrheal Diseases Branch, CDC, at 404-639-2205, or mail to: FBO Reporting, Foodborne and Diarrheal Diseases Branch, CDC Mail Stop A-38, 1600 Clifton Road, Atlanta, GA, 30333.

APPENDIX D
Sample Collection

D.1 General Guidelines for Stool Sample Collection

GENERAL GUIDELINES FOR STOOL SAMPLE COLLECTION

The KDHE laboratory provides two types of stool kits to LHDs:

(1) Enteric kits, which test for *Campylobacter, Salmonella, Shigella,* and virulent *E. coli* for culture and identification. These kits may also be used to test for Norovirus. However, testing for Norovirus is conducted only in outbreak situations and must be cleared by Epidemiologic Services at (877) 427-7317.

(2) Ova and parasite (O&P) kits, which identify intestinal parasites, including *Cryptosporidium parvum* and *Giardia lamblia*.

Three sets of each kit (enteric and O&P) are recommended to be kept on hand.

Requesting stool kits from the KDHE laboratory:

1. Complete the following requisition for laboratory specimen kits.
2. Under the subheading Bacterial Culture, indicate the number of kits requested next to the label "Enteric".
3. Under the subheading Parasite (O&P), indicate the number of kits requested next to the label "Feces".
4. Fax completed form to the KDHE laboratory at (785) 296-1641.

Distributing and Collecting Stool Samples:

1. Provide 1 stool kit to persons experiencing diarrhea, defined as 3 or more loose stools within a 24-hour period. In outbreak situations, 5 to 8 stool samples are ideal.
2. Ask person(s) to return stool sample(s) to health department.
3. Fill out all items on Page 1 of the KDHE Laboratory Universal Form.
4. If bacterial cultures are requested, mark the appropriate box on Page 2, under the subheading Bacteriology Culture.
5. If parasitic identification is requested, mark the appropriate box on Page 2, under the subheading Parasitology.
6. Apply one barcode label from the KDHE Laboratory Universal Form to each stool collection vial.
7. Place vials and universal form in an appropriate shipping container.
8. Mail stool sample(s) to the following address:
   Kansas Department of Health and Environment
   Division of Health & Environmental Laboratories
   Forbes Field, Building 740
   Topeka, KS 66620

For questions regarding patients and symptoms, contact Epidemiologic Services at (877) 427-7317. For questions regarding laboratory specimen submission, contact the KDHE Laboratory at (785) 296-1620.

D.2 General Guidelines for Food Sample Collection

GENERAL GUIDELINES FOR FOOD SAMPLE COLLECTION

Microbiological analysis of food is provided in support of an investigation of a foodborne disease outbreak. The purpose of testing is to isolate and identify pathogenic microorganisms in food samples, which have been implicated in the outbreak.

Submission of Food Samples for Analysis

Food sample collection is most often conducted by a food inspector. However, submission to the KDHE laboratory for testing should be conducted by the local health department (LHD).

All requests for laboratory examination of food or food-related samples must be made through KDHE's Epidemiologic Services at (877) 427-7317. Laboratory examination of food will be performed only when pre-approved. Results of food analysis will be reported to Epidemiologic Services and the LHD responsible for submission.

Method for Collecting Aseptic Samples

The value of laboratory results in microbiology depends on the quality of the samples submitted. Food samples must be obtained using aseptic technique and appropriate containers. Samples must be refrigerated during storage and transport and must arrive at the food microbiology laboratory within three days of collection. Samples collected frozen should be stored and transported frozen (on dry ice).

1. Use sterile containers and ensure that leakage is prevented.
2. Wash hands prior to putting gloves on.
3. Do not touch inside of collection container.
4. Use sterile utensils, such as a tongue depressor to collect food.
5. Collect an adequate amount of the sample—a minimum of 4-6 ounces, if possible.
6. Fill the container no more than ¾ full.
7. Keep food cold by placing it in the styrofoam cooler with an ice pack. Use additional ice when necessary.
8. Clearly document how the product was handled and who handled it after the sample is taken.

Labeling Food Samples

1. Name and type of product
2. Brand of product
3. Product manufacturer
4. Inspector name
5. Date, time, and place of collection
6. Establishment name

Transporting Food Samples

1. Submit sample to the LHD infection control nurse in the county where the outbreak occurred.
2. LHD nurse should complete a KDHE Universal Laboratory Specimen Submission Form. On Page 1, under "Sample Information" and subheading "Clinical Source", mark "Other" and write 'Food Sample'. On Page 2, under the subheading "Submitter Comments", indicate that the food is related to an outbreak investigation and that testing was approved by KDHE Epidemiology at (877) 427-7318.
3. Sample should be sent via the KDHE courier or FedEx using ice packs and an insulated container.

NOTE: Food should be kept cold during transportation and placed in a refrigerator when not in transit.

Recommended Sampling Equipment

- Sterile sample containers
  - Plastic bags (Whirl-Pak)
- Sterile and wrapped sample collection implements
  - Tongue depressors
  - Swabs
  - Individually wrapped plastic spoons
- Supporting equipment
  - Individually wrapped disposable gloves
- Sterilizing and sanitizing agents
  - Alcohol swabs
- Refrigerants
  - Ice pack
  - Thermometer
  - Insulated container (Styrofoam cooler)

D.3 Requisition Form for Ordering Stool Kits

DIVISION OF HEALTH AND ENVIRONMENTAL LABORATORIES
DEPARTMENT OF HEALTH AND ENVIRONMENT
Forbes Field, Building 740
Topeka, Kansas 66620-0001

REQUISITION FOR LABORATORY SPECIMEN KITS

Please use the appropriate kit listed below to submit specimens to the Health and Environmental Laboratories. Each kit consists of a specimen container, an addressed mailing container, and a test request form. If you have any questions about submitting specimens, please refer to the Manual of Laboratory Tests or call (785) 296-1623.

RUSH ORDERS: FAX to (785) 296-1641

Please enter the quantity needed on the line next to the item.

Serology

_____ Single Mailer
_____ Multi-mailer without box
_____ Multi-mailer with box

Viral Culture

_____ Virus*

Neonatal Screening

_____ Initial (Green) Collection Unit
_____ Repeat (Red) Collection Unit

Inorganic Chemistry

_____ Filter Paper Forms for Blood Lead
_____ Blood Lead Confirmation Kits

Forms Only

_____ Universal
_____ Blood Lead Confirmation

Parasite (O & P)

_____ Feces
_____ Pinworm*

Gonorrhea

_____ Culture Plates
_____ Mailer, Two Specimen
_____ CO_2 Tablets
_____ Whirl-Pak Bag

Bacterial Culture

_____ Enteric
_____ TB, Sputum
_____ TB, Gastric
_____ Miscellaneous - Infectious Substance Shipper
_____ Miscellaneous Kit for Non-Infectious Specimens

Other

_____ (Specify):_____

Serology Assays: Hepatitis (HBsAg*, HAV-IgM*, HCV****), Rubella*, HIV ****

* Provided to City/County Health Departments only. ** AIDS Counseling & Testing and Prenatal Testing sites only.
*** Contact Epidemiologic Services 296-1127 first . **** Drug abuse associated HIV CT Clients only.

Send to:

Facility ID No. : _____

Facility Name: _____

Attn: _____

Address: _____

City: _____ **, KS** _____

Phone: _____

LAB USE ONLY

Order Number _____
Date Received _____
Date Shipped _____
By _____

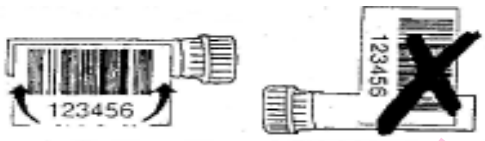
MR-1 Rev. 07/10/03

D.4 Sample Copy of KDHE Universal Laboratory Specimen Submission Form

KDHE Universal Laboratory Specimen Submission Form (Health)

1. Print firmly and neatly.
2. Use only pens with dark ink.
3. Fill in squares LIKE THIS: ☒ or this ■
4. Print capital letters only and numbers completely inside boxes: A B C 1 2 3
5. Please complete all items on form.

NOTE: THE ENTIRE LABEL MUST BE APPLIED LENGTHWISE ON THE COLLECTION TUBE. ENTIRE BARCODE MUST BE VISIBLE AND SCANNABLE LENGTHWISE! (SEE DIAGRAM BELOW):



PROVIDER INFORMATION:

FACILITY ID

PHYSICIAN'S LAST NAME

PATIENT INFORMATION:

PATIENT'S LAST NAME

PATIENT'S FIRST NAME

KDHE Approved Label Only
Affix 4" x 1" Label Uniquely and Level!!
Call (785) 296-1620 for Information

PATIENT'S CODE

SEX ☐ M ☐ F

BIRTHDATE / /

CO OF RES

MEDICAID NUMBER

RACE
☐ White ☐ Asian ☐ AI, AN
☐ Black ☐ HN, PI

ETHNICITY
☐ Hispanic or Latino
☐ Non-Hispanic or Non-Latino

SAMPLE INFORMATION:

DATE OF COLLECTION / /

DATE OF ONSET / /

PATIENT SYMPTOMS
☐ Yes
☐ No

CLINIC SOURCE
☐ Adolescent ☐ Prison
☐ C & T ☐ University
☐ Drug ☐ STD
☐ FP ☐ TB
☐ M & I ☐ Other*
☐ Prenatal *Specify _____

SPECIMEN TYPE
☐ Blood ☐ Plasma ☐ Urine ☐ Pericardial Fluid
☐ Bronchial ☐ Serum ☐ Urethral ☐ Peritoneal Fluid
☐ CSF ☐ Sputum ☐ Vaginal ☐ Pleural Fluid
☐ Endocervical ☐ Stool ☐ Wound ☐ Synovial Fluid
☐ Genital ☐ Throat ☐ Other* ☐ Thoracentesis Fluid
☐ Nasopharyngeal ☐ Tissue *Specify _____

ACUTE SERUM / /

CONVALESCENT SERUM / /

DO NOT WRITE IN THE SPACE BELOW - DO NOT PHOTOCOPY THIS FORM

Kansas Department of Health and Environment
Division of Health & Environmental Laboratories
Forbes Field, Building 740, Topeka, KS 66620
CLIA #17DO648254
Phone (785) 296-1620
Fax (785) 296-1641

V03.1

1 2 3 4 5 6 7

D.4

TEST INFORMATION/REQUEST

HIV Serology

Risk Code *Ref Code* *Prior Confirmation* *Specimen* *Test Purpose*

Prior Confirmation: ☐ Yes ☐ No

Specimen: ☐ Initial Specimen ☐ Referral ☐ Repeat

Test Purpose: ☐ Diagnosis ☐ Other ☐ Prenatal

Hepatitis

If a HBsAG is requested with another serology test, 5 ml of serum or 2 tubes of blood must be submitted (HAV, HCV, HIV, RUBI, SYPH, etc.)

HAV-IgM ☐ Exposure Risk
HBsAG ☐ Household Contact & Prenatal
☐ Sexual Contact
HCV-IgG ☐ IVDU Hist w/Sexual Partner
☐ Other Assays

Other Serological Assays

☐ IgM ☐ IgG ☐ CSF
☐ Vaccine Preventable ☐ Other
Specify _____

Syphilis Serology

Test Purpose
☐ Diagnosis ☐ Prenatal ☐ Other

Clinical Information
☐ Asymptomatic ☐ Late Syphilis Symptoms ☐ Treatment Control

Prior Reagin Reactive Test
☐ RPR, RST or VDRL
Test Date 1)_____
2)_____

Rubella

☐ Immune Status/Prenatal ☐ Diagnosis ☐ Date of Exposure _____

Nucleic Acid Amplified Tests for Chlamydia and Gonorrhea

Exam Purpose
☐ Comp FP Exam ☐ PN Exam ☐ STD Exam

Clinical Observations
☐ Cervicitis ☐ Friable ☐ Arthritis ☐ Repeat ☐ PID-Like ☐ None

Risk History
☐ New Partner ☐ None ☐ Multiple Partners ☐ Contact of STD Case

Pertussis

☐ PCR ☐ Other _____

Viral Cultures

Specimen Material
☐ ID ☐ Swab ☐ Body Fluid ☐ Biopsy ☐ Culture ☐ Autopsy

Viral Syndrome Observed
☐ Gastroenteritis ☐ Ocular ☐ Vesicles
☐ Genital Lesion ☐ Respiratory ☐ Specfic Viral Agents
☐ Vaccine Preventable Disease ☐ Neurological Specify _____
☐ Other - Specify _____

Blood Lead

Patient Address Required for Blood Lead Specimens

☐ Capillary
☐ Venous
☐ Repeat Specimen

Patient Address
City, State, Zip

Bacteriology Culture

☐ Enteric Screen
☐ R/O Other Enteric Organisms
Specify _____
☐ Bacterial Identification
Suspected _____
☐ Gonorrhea Culture
(non-genital/legal)

Tuberculosis

☐ Culture w/Smear
☐ Mycobacterium Isolate for ID

Parasitology

☐ Intestinal Parasite (Not Cryptosporidium) ☐ Non-Fecal Specimen

☐ R/O Cryptosporidium. Patient Condition should include one of the following): Specify _____

☐ Watery Diarrhea
☐ Institution Resident
☐ Immune Suppressed
☐ Year Old

☐ Arthropod/Insect ID
☐ Pinworm Exam (Co. Health Dept. Only)

CDC Provided Tests

Specify

Submitter Comments

DO NOT WRITE IN THE SPACE BELOW - DO NOT PHOTOCOPY THIS FORM

Kansas Department of Health and Environment
Division of Health & Environmental Laboratories
Forbes Field, Building 740, Topeka, KS 66620
CLIA #17DO648254
Phone (785) 296-1620
Fax (785) 296-1641

V03.1

1 2 3 4 5 6 7

D.4

APPENDIX E
Data Analyses

E.1 Conducting Data Analyses

ANALYZING THE DATA COLLECTED

The following should be calculated to understand the data collected: frequencies and percentages, the incubation and recovery periods, the measures of association between exposure and disease, and appropriate tests of statistical significance.

EpiInfo™ Version 3.2.2 (released April 14, 2004) is a user-friendly, Windows-based software that is available for free by the CDC that may be used to conduct these specific analyses. Visit www.cdc.gov/epiinfo/ to download.

STEP 1. Calculate frequencies

COUNTS and **PERCENTAGES** should be calculated to define the outbreak. The following is a list of common calculations.

- For all individuals (cohort or case-control study)
  - Number and percentage of persons by sex
  - Median age and age range
  - Number and percentage of ill ("cases") and not ill ("controls")
  - Other characteristics may be recommended depending upon the outbreak, including race/ethnicity, occupation, county, state, zip code, school name, school grade, nursing home name, room number

- Total number of persons exposed (cohort study)

- For ill persons or cases (cohort or case-control study)
  - Number and percentage of each symptom experienced
    - Diarrhea (3 or more loose stools in a 24-hour period), bloody diarrhea, vomiting, nausea, abdominal cramping, fever, malaise, headache are common symptoms
  - Number of samples collected and submitted for testing
    - Stool, blood, urine
  - Number and percentage of laboratory-confirmed results
  - Number and percentage of persons hospitalized
  - Number and percentage of medical visits

STEP 2. Calculate the incubation period and recovery period

The **INCUBATION PERIOD** is the interval from the time an individual is infected (exposed) to the time when symptoms first appear. The incubation period may differ from person to person and from organism to organism.

Incubation period = onset time – time of exposure

EXAMPLE: Time of exposure = 8:00 P.M. on Saturday evening
Onset of symptoms = 2:00 A.M. on Monday morning

1. Determine how many hours there were per day.

   Hint: Time listed in military time and days listed in 24-hour increments will make calculations much easier for most analytic software.

   Saturday: 8:00 P.M. is equivalent to 20:00 in military time. So, 24:00 – 20:00 = 4 hours
   Sunday: All hours were of interest = 24 hours
   Monday: 2:00 A.M. is equivalent to 02:00 in military time = 2 hours

2. Add all the hours together for the days of interest.

   4 + 24 + 2 = 30 hours

   30 hours / 24 hours = 1.25 days

   Incubation period for ill person = 30 hours or 1.3 days

3. Calculate the incubation period for each ill person. Determine the **median** incubation period (the mid-point or middle value) and the **range** (the minimum and maximum numbers).

Person	Incubation Period	
# 1	14 hours	← Minimum
# 2	18 hours	
# 3	23 hours	
# 4	30 hours	← Median
# 5	36 hours	
# 6	45 hours	
# 7	47 hours	← Maximum

Incubation period median = 30 hours

Incubation period range = 14 hours – 47 hours

The **RECOVERY PERIOD** is the period when symptoms decline and illness improves.

Recovery period = recovery time – onset time

EXAMPLE: Onset of symptoms = 2:00 A.M. on Monday morning
Recovery from illness = 11:00 P.M. on Tuesday evening

1. Determine how many hours there were per day.

Hint: Time listed in military time and days listed in 24-hour increments will make calculations much easier for most analytic software.

Monday: 2:00 A.M. is equivalent to 02:00 in military time. So, 24:00 – 2:00 = 22 hours
Tuesday: 11:00 P.M. is equivalent to 23:00 in military time. So the hours of interest on Tuesday = 23 hours

2. Add all the hours together for the days of interest.

22 + 23 = 45 hours

45 hours / 24 hours = 1.88 days

Recovery period for ill person = 45 hours or 1.9 days

3. Calculate the recovery period for each ill person. Determine the **median** recovery period (the mid-point or middle value) and the **range** (the minimum and maximum numbers).

Person	Recovery Period	
# 1	28 hours	← Minimum
# 2	29 hours	
# 3	33 hours	
# 4	37 hours	← Median
# 5	40 hours	
# 6	45 hours	
# 7	51 hours	← Maximum

Recovery period median = 37 hours

Recovery period range = 28 hours – 51 hours

STEP 3. Utilize the 2 x 2 table to calculate measures of association

A 2 x 2 contingency table can be used to compare the association between illness and exposure.

	Ill	**Not Ill**	
Exposed	**a**	**b**	**(a + b)**
Not Exposed	**c**	**d**	**(c + d)**
	(a + c)	**(b + d)**	**a + b + c + d**

Interpretation of the elements in the 2 x 2 table

a = the number of ill persons who were exposed to a specific risk factor
b = the number of persons who did not become ill, but were exposed to a specific risk factor
c = the number of ill persons who were not exposed to a specific risk factor
d = the number of persons who did not become ill and were not exposed to a specific risk factor

(a + b) = the total number of persons exposed
(c + d) = the total number of persons not exposed
(a + c) = the total number of ill persons
(b + d) = the total number of not-ill persons

a + b + c + d = the total number of persons

CALCULATIONS FOR COHORT STUDIES

Using a 2 x 2 table, attack rates, food-specific attack rates, and relative risk ratios may be calculated to describe the association between illness and exposure for cohort studies.

ATTACK RATES (includes food-specific attack rates)

An **attack rate** represents the occurrence of disease observed among a defined population over a limited period of time. Specifically, it is used to calculate (1) the percentage of illness among all individuals who were exposed to a specific risk factor and (2) the percentage of illness among all individuals who were not exposed to the specific risk factor.

$$\textbf{Attack rate for ill persons who were exposed} = \frac{a}{a+b} \times 100$$

$$\textbf{Attack rate for ill persons who were not exposed} = \frac{c}{c+d} \times 100$$

RELATIVE RISK

A **relative risk (RR)** is the measure of association between exposure and illness used for cohort studies. It is the ratio of the attack rate for ill persons who were exposed and the attack rate for ill persons who were not exposed.

$$\textbf{Relative risk ratio} = \frac{\textbf{Attack rate for ill persons who were exposed}}{\textbf{Attack rate for ill persons who were not exposed}} = \frac{a/a+b}{c/c+d}$$

Interpretation of Relative Risk (RR)[†]:

RR = 1: The risk of illness among exposed persons is the same as the risk of illness among those not exposed.

RR>1: The risk of illness among exposed persons is higher than the risk of illness among those not exposed.

RR<1: The risk of illness among exposed persons is lower than the risk of illness among those not exposed.

[†] "E. coli O157:H7 Infection in Michigan" Computer-based Case Study. www.phppo.cdc.gov/phtn/casestudies/computerbased.

EXAMPLE: One hundred fifty individuals attended a wedding reception. Several persons became ill with diarrhea and vomiting between 12 and 48 hours after eating food served at the reception. Calculate the attack rates for (1) ill persons who ate the food served at the reception and (2) ill persons who did not eat the food served at the reception. Also calculate the relative risk (RR) ratio and interpret the results.

	Ill	**Not Ill**	
Ate food at reception	72	63	135
Did not eat food at reception	2	13	15
	74	76	150

Attack rate for ill persons who ate food = $\frac{\mathbf{72}}{\mathbf{135}}$ **X 100 = 53.3%**

Attack rate for ill persons who did not eat food = $\frac{\mathbf{2}}{\mathbf{15}}$ **X 100 = 13.3%**

RR = $\frac{\textbf{Attack rate for ill persons who ate at the reception}}{\textbf{Attack rate for ill persons who did not eat at the reception}} = \frac{\mathbf{72/135}}{\mathbf{2/15}}$

$= \frac{\mathbf{.533}}{\mathbf{.133}} = \mathbf{4.0}$

Interpretation: About 53% of the persons who became ill had eaten the food served at the reception compared to 13% who became ill and had not eaten the food. In other words, the risk of illness among persons who ate food at the reception appears to be 4 times higher than the risk of illness among persons who did not eat food at the reception.

EXAMPLE: One hundred thirty-five individuals attended the wedding reception and ate the food served. Specific foods served included salad, dinner rolls, chicken, and cake. Calculate the food-specific attack rates for (1) ill persons who ate each of these items and (2) ill persons who did not eat each of these items. Also calculate the respective relative risk (RR) ratios and interpret the results.

EATING SALAD *vs.* BECOMING ILL

	Ill	**Not Ill**	
Ate salad	63	52	115
Did not eat salad	10	10	20
	72	63	135

Attack rate for ill persons who ate salad $= \frac{63}{115} \times 100 = 54.8\%$

Attack rate for ill persons who did not eat salad $= \frac{10}{20} \times 100 = 50\%$

$$\textbf{RR} = \frac{\text{Attack rate for ill persons who ate salad}}{\text{Attack rate for ill persons who did not eat salad}} = \frac{63/115}{10/20}$$

$$= \frac{.548}{.50} = 1.1$$

Interpretation: About 55% of the persons who became ill had eaten the salad served at the reception compared to 50% who became ill and had not eaten the salad. In other words, the risk of illness among persons who ate salad served at the reception was almost the same as the risk of illness among persons who did not eat the salad.

EATING DINNER ROLLS *vs.* BECOMING ILL

	Ill	Not Ill	
Ate dinner rolls	57	40	97
Did not eat dinner rolls	15	23	38
	72	63	135

Attack rate for ill persons who ate rolls $= \frac{57}{97} \times 100 = 58.8\%$

Attack rate for ill persons who did not eat rolls $= \frac{15}{38} \times 100 = 39.5\%$

$$\textbf{RR} = \frac{\text{Attack rate for ill persons who ate rolls}}{\text{Attack rate for ill persons who did not eat rolls}} = \frac{57/97}{15/38}$$

$$= \frac{.588}{.395} = 1.49$$

Interpretation: About 59% of the persons who became ill had eaten the dinner rolls served at the reception compared to 40% who became ill and had not eaten the dinner rolls. In other words, the risk of illness among persons who ate the dinner rolls served at the reception was 1.5 times higher than the risk of illness among persons who did not eat the dinner rolls.

EATING CHICKEN *vs.* BECOMING ILL

	Ill	Not Ill	
Ate chicken	66	57	123
Did not eat chicken	6	6	12
	72	63	135

Attack rate for ill persons who ate chicken $= \frac{66}{123}$ **X 100 = 53.7%**

Attack rate for ill persons who did not eat chicken $= \frac{6}{12}$ **X 100 = 50%**

RR $= \frac{\text{Attack rate for ill persons who ate chicken}}{\text{Attack rate for ill persons who did not eat chicken}} = \frac{66/123}{6/12}$

$= \frac{.537}{.50} =$ **1.1**

Interpretation: About 54% of the persons who became ill had eaten the chicken served at the reception compared to 50% who became ill and had not eaten the chicken. In other words, the risk of illness among persons who ate chicken served at the reception was almost the same as the risk of illness among persons who did not eat the chicken.

EATING CAKE *vs.* BECOMING ILL

	Ill	Not Ill	
Ate cake	66	28	94
Did not eat cake	6	35	41
	72	63	135

Attack rate for ill persons who ate cake $= \frac{66}{94} \times 100 = 70.2\%$

Attack rate for ill persons who did not eat cake $= \frac{6}{41} \times 100 = 14.6\%$

$$\textbf{RR} = \frac{\text{Attack rate for ill persons who ate cake}}{\text{Attack rate for ill persons who did not eat cake}} = \frac{66/94}{6/41}$$

$$= \frac{.702}{.146} = 4.8$$

Interpretation: About 66% of the persons who became ill had eaten the cake served at the reception compared to 24% who became ill and had not eaten the cake. In other words, the risk of illness among persons who ate cake served at the reception was almost 5 times higher than the risk of illness among persons who did not eat cake.

OVERALL INTERPRETATION: Based on the attack rates and relative risk ratios for each food item served at the reception, cake appears to be the suspect food item.

CALCULATIONS FOR CASE-CONTROL STUDIES

The 2 x 2 table may also be used to calculate the odds ratio for case-control studies.

The **ODDS RATIO (OR)** measures whether a specific exposure is associated with a certain disease. In other words, it is the ratio of the odds that the cases were exposed to the odds that the controls were exposed. Odds ratios related to exposure to specific food items can also be calculated.

NOTE: The relative risk ratio cannot be used to measure the association between exposure and illness for case-control studies because the total population exposed is not well-defined.

	Ill	**Not Ill**	
Exposed	**a**	**b**	**(a + b)**
Not Exposed	**c**	**d**	**(c + d)**
	(a + c)	**(b + d)**	**a + b + c + d**

Odds that the cases were exposed $= \frac{a}{b}$

Odds that the controls were exposed $= \frac{c}{d}$

$$\textbf{OR} = \frac{\text{Odds that the cases were exposed}}{\text{Odds that the controls were exposed}} = \frac{a/b}{c/d} = \frac{ad}{bc}$$

Interpretation of Odds Ratio (OR)[†]:

OR = 1: The odds of exposure among cases is the same as the odds of exposure among controls.

OR>1: The odds of exposure among cases is higher than the odds of exposure among controls.

OR<1: The odds of exposure among cases is lower than the odds of exposure among controls.

[†] "E. coli O157:H7 Infection in Michigan" Computer-based Case Study. www.phppo.cdc.gov/phtn/casestudies/computerbased.

EXAMPLE: Five persons reported eating at Restaurant X and becoming ill. After conducting a case-control study, the following numbers were obtained. Calculate the odds ratio and interpret the results. Also calculate the odds of becoming ill from eating a beef dish served at Restaurant X.

ODDS OF BECOMING A CASE FROM EATING AT RESTAURANT X

	Case	Control	
Ate at Restaurant X	25	30	55
Did not eat at Restaurant X	10	40	50
	35	70	105

$$\textbf{OR} = \frac{\textbf{Odds that the cases ate at Restaurant}}{\textbf{Odds that the controls ate at Restaurant}} = \frac{\textbf{25 / 30}}{\textbf{10 / 40}} = \frac{\textbf{25(40)}}{\textbf{30(10)}} = \frac{\textbf{1000}}{\textbf{300}}$$

$$= \textbf{3.3}$$

Interpretation: The odds of exposure to Restaurant X was 3 times higher among cases than controls. It can be concluded that eating at Restaurant X may have contributed to illness.

ODDS OF BECOMING A CASE FROM EATING BEEF AT RESTAURANT X

	Case	Control	
Ate beef at Restaurant X	30	13	43
Did not eat beef at Restaurant X	3	9	12
	33	22	55

$$\textbf{OR} = \frac{\textbf{Odds that the cases ate beef}}{\textbf{Odds that the controls ate beef}} = \frac{\textbf{30 / 13}}{\textbf{3 / 9}} = \frac{\textbf{30(9)}}{\textbf{13(3)}} = \frac{\textbf{270}}{\textbf{39}}$$

$$= \textbf{6.9}$$

Interpretation: The odds of exposure to beef at Restaurant X was almost 7 times higher among cases than controls. It can be concluded that eating beef at Restaurant X may have contributed to illness.

SIGNIFICANCE TESTING OF THE RR AND THE OR

Tests of significance are calculated to determine if the association between exposure and illness occurred by chance alone. In other words, was the association observed between exposure and illness a random occurrence? The **95% confidence intervals** and the ***p*-values** may be calculated to determine the significance of the association between exposure and illness.

The 95% confidence intervals indicate how "confident" one can be that the RR or the OR observed actually lies within a range of numbers. In contrast, *p*-values represent the probability that the association observed between exposure and illness could have occurred by chance alone. Many statistical programs, like EpiInfo™, readily calculate these values. Refer to these statistical programs or statistical books for more information.

APPENDIX F
Final Epidemiology Report

F.1 Writing the Final Report

FORMAT FOR WRITING AN OUTBREAK REPORT

The following is a standard format of a written outbreak report. The format may be modified depending on the complexity of the outbreak.

INTRODUCTION
BACKGROUND
METHODS
- Epidemiologic
- Environmental
- Laboratory and clinical

RESULTS
- Epidemiologic
- Environmental
- Laboratory and clinical

DISCUSSION
RECOMMENDATIONS
ACKNOWLEDGEMENTS
SUPPORTING DOCUMENTS

The **INTRODUCTION** should include the following information:
- Who first reported the outbreak?
- When was the outbreak reported?
- What steps were taken to determine that an outbreak had occurred?
- What entities were involved with initiating the outbreak investigation?

The **BACKGROUND** should include the following information:
- What are the circumstances surrounding the outbreak?
- Where did the outbreak occur?
- What preliminary information was known?
    - Demographics of the affected group
    - Number of persons exposed
    - Number of persons ill
    - Severity and clinical picture of ill persons

The **METHODS** section should include epidemiologic, environmental, and laboratory or clinical information:
- Epidemiologic
    - What was the case definition?
    - What investigation tools were used to collect or organize the information?
        - Line list
        - Epidemic curves
        - Maps
        - Chart reviews
        - Communication with health care providers
        - Questionnaire

    - If a questionnaire was administered, how was it administered?
        - Self-administered?
        - By phone?
        - In person?
        - Electronically?
    - What type of study was conducted?
    - What statistical analyses were conducted?
    - What hypotheses were generated?
    - What prevention and control measures were implemented?
    - What entities were involved?
    - What specific tasks were conducted?
- Environmental
    - What kind of environmental investigation was conducted?
    - Was a HACCP investigation performed?
    - Were there any tracebacks?
    - What was the physical layout of the outbreak?
- Laboratory and clinical
    - Were stool samples collected for testing?
    - Were food samples collected for testing?
    - What tests were conducted?
    - Where was testing performed?

The **RESULTS** section should also include epidemiologic, environmental, and laboratory or clinical information:

- Epidemiologic
    - Total number of persons exposed (cohort study)
    - For all individuals (cohort or case-control study)
        - Number and percentage of persons by age group
        - Number and percentage of persons by sex
        - Number and percentage of other demographics collected
    - Number and percentage of ill ("cases") and not-ill ("controls")
    - For ill persons or cases (cohort or case-control study)
        - Number and percentage of each symptom experienced
        - Number of samples collected
        - Number and percentage of positive results
        - Number and percentage of persons hospitalized
        - Number and percentage of medical visits
        - Incubation period (median and range)
        - Recovery period (median and range)
    - Overall attack rates and food-specific attack rates (cohort study)
    - Measures of association
        - Relative risk (cohort study)
        - Odds ratio (case-control study)
    - Any additional results
- Environmental

    - What were the results of the investigation or inspection, including any HACCP assessment?
    - What were the results of any food tracebacks, if done?
    - What were potential environmental factors that may have contributed to the outbreak?
- Laboratory and clinical
    - What were the results of the human samples submitted?
    - What were the results of any food samples tested?

The **DISCUSSION** section should make interpretations of all the information collected during the outbreak investigation.

- Taking into account all the information collected, what can be concluded about the outbreak?
- Did the results from the epidemiologic investigation, environmental investigation, and laboratory testing support the hypotheses generated?
- Were there any important or interesting outcomes or findings?

The **RECOMMENDATIONS** section should provide educational information to aid others in outbreak investigations.

- What can be learned from this outbreak?
- Were the prevention and control measures implemented successful?
- What measures would prevent future occurrences?

The **ACKNOWLEDGEMENTS** section should recognize personnel who assisted in the outbreak investigation.

The **SUPPORTING DOCUMENTS** section should include any relevant information. Important documentation includes the following:

- Copy of the questionnaire or survey tool used
- Tables, epidemic curves, or maps
- Inspection reports

APPENDIX G
Foodborne Illness and Etiology Tables

G.1 Etiologic Agents to Consider for Various Manifestations of Foodborne Illness

Taken from Centers for Disease Control and Prevention. "Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and other Health Care Professionals." *MMWR* 2004:53 (No. RR-4).

TABLE 1. Etiologic agents to consider for various manifestations of foodborne illness

Clinical presentation	Potential food-related agents to consider
Gastroenteritis (vomiting as primary symptom; fever and/or diarrhea also may be present)	Viral gastroenteritis, most commonly rotavirus in an infant or norovirus and other caliciviruses in an older child or adult; or food poisoning due to preformed toxins (eg, vomitoxin, *Staphylococcus aureus* toxin, *Bacillus cereus* toxin) and heavy metals.
Noninflammatory diarrhea (acute watery diarrhea without fever/dysentery; some patients may present with fever)*	Can be caused by virtually all enteric pathogens (bacterial, viral, parasitic) but is a classic symptom of Enterotoxigenic *Escherichia coli* *Giardia* *Vibrio cholerae* Enteric viruses (astroviruses, noroviruses and other caliciviruses, enteric adenovirus, rotavirus) *Cryptosporidium* *Cyclospora cayetanensis*
Inflammatory diarrhea (invasive gastroenteritis; grossly bloody stool and fever may be present)†	*Shigella* species *Campylobacter* species *Salmonella* species Enteroinvasive *E. coli* Enterohemorrhagic *E. coli* *E. coli* O157:H7 *Vibrio parahaemolyticus* *Yersinia enterocolitica* *Entamoeba histolytica*
Persistent diarrhea (lasting ≥14 days)	Prolonged illness should prompt examination for parasites, particularly in travelers to mountainous or other areas where untreated water is consumed. Consider *Cyclospora cayetanensis, Cryptosporidium, Entamoeba histolytica,* and *Giardia lamblia*.
Neurologic manifestations (eg, paresthesias, respiratory depression, bronchospasm, cranial nerve palsies)	Botulism (*Clostridium botulinum* toxin) Organophosphate pesticides Thallium poisoning Scombroid fish poisoning (histamine, saurine) Ciguatera fish poisoning (ciguatoxin) Tetradon fish poisoning (tetradotoxin) Neurotoxic shellfish poisoning (brevitoxin) Paralytic shellfish poisoning (saxitoxin) Amnesic shellfish poisoning (domoic acid) Mushroom poisoning Guillain-Barré syndrome (associated with infectious diarrhea due to *Campylobacter jejuni*)
Systemic illness (eg, fever, weakness, arthritis, jaundice)	*Listeria monocytogenes* *Brucella* species *Trichinella spiralis* *Toxoplasma gondii* *Vibrio vulnificus* Hepatitis A and E viruses *Salmonella* Typhi and *Salmonella* Paratyphi Amebic liver abscess

* Noninflammatory diarrhea is characterized by mucosal hypersecretion or decreased absorption without mucosal destruction and generally involves the small intestine. Some affected patients may be dehydrated because of severe watery diarrhea and may appear seriously ill. This is more common in the young and the elderly. Most patients experience minimal dehydration and appear mildly ill with scant physical findings. Illness typically occurs with abrupt onset and brief duration. Fever and systemic symptoms usually are absent (except for symptoms related directly to intestinal fluid loss).

† Inflammatory diarrhea is characterized by mucosal invasion with resulting inflammation and is caused by invasive or cytotoxigenic microbial pathogens. The diarrheal illness usually involves the large intestine and may be associated with fever, abdominal pain and tenderness, headache, nausea, vomiting, malaise, and myalgia. Stools may be bloody and may contain many fecal leukocytes.

G.2 Foodborne Illnesses

Taken from Centers for Disease Control and Prevention. "Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and other Health Care Professionals." *MMWR* 2004:53 (No. RR-4).

Foodborne Illnesses (Bacterial)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Bacillus anthracis	2 days to weeks	Nausea, vomiting, malaise, bloody diarrhea, acute abdominal pain.	Weeks	Insufficiently cooked contaminated meat.	Blood.	Penicillin is first choice for naturally acquired gastrointestinal anthrax. Ciprofloxacin is second option.
Bacillus cereus (preformed enterotoxin)	1–6 hrs	Sudden onset of severe nausea and vomiting. Diarrhea may be present.	24 hrs	Improperly refrigerated cooked or fried rice, meats.	Normally a clinical diagnosis. Clinical laboratories do not routinely identify this organism. If indicated, send stool and food specimens to reference laboratory for culture and toxin identification.	Supportive care.
Bacillus cereus (diarrheal toxin)	10–16 hours	Abdominal cramps, watery diarrhea, nausea.	24–48 hours	Meats, stews, gravies, vanilla sauce.	Testing not necessary, self-limiting (consider testing food and stool for toxin in outbreaks).	Supportive care.
Brucella abortus, B. melitensis, and *B. suis*	7–21 days	Fever, chills, sweating, weakness, headache, muscle and joint pain, diarrhea, bloody stools during acute phase.	Weeks	Raw milk, goat cheese made from unpasteurized milk, contaminated meats.	Blood culture and positive serology.	*Acute:* Rifampin and doxycycline daily for ≥6 weeks. Infections with complications require combination therapy with rifampin, tetracycline, and an aminoglycoside.
Campylobacter jejuni	2–5 days	Diarrhea, cramps, fever, and vomiting; diarrhea may be bloody.	2–10 days	Raw and undercooked poultry, unpasturized milk, contaminated water.	Routine stool culture; *Campylobacter* requires special media and incubation at 42°C to grow.	Supportive care. For severe cases, antibiotics such as erythromycin and quinolones may be indicated early in the diarrheal disease. Guillain-Barré syndrome can be a sequela.
Clostridium botulinum—children and adults (preformed toxin)	12–72 hrs	Vomiting, diarrhea, blurred vision, diplopia, dysphagia, and descending muscle weakness.	Variable (from days to months). Can be complicated by respiratory failure and death.	Home-canned foods with a low acid content, improperly canned commercial foods, home-canned or fermented fish, herb-infused oils, baked potatoes in aluminium foil, cheese sauce, bottled garlic, foods held warm for extended periods of time (eg, in a warm oven).	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some state health department laboratories and CDC.	Supportive care. Botulinum antitoxin is helpful if given early in the course of the illness. Contact the state health department. The 24-hour number for state health departments to call is (770) 488-7100.
Clostridium botulinum—infants	3–30 days	In infants <12 months, lethargy, weakness, poor feeding, constipation, hypotonia, poor head control, poor gag and sucking reflex.	Variable	Honey, home-canned vegetables and fruits, corn syrup.	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some state health department laboratories and CDC.	Supportive care. Botulism immune globulin can be obtained from the Infant Botulism Prevention Program, Health and Human Services, California (510-540-2646). Botulinum antitoxin is generally not recommended for infants.
Clostridium perfringens toxin	8–16 hrs	Watery diarrhea, nausea, abdominal cramps; fever is rare.	24–48 hrs	Meats, poultry, gravy, dried or precooked foods, time- and/or temperature-abused food.	Stools can be tested for enterotoxin and cultured for organism. Because *Clostridium perfringens* can normally be found in stool, quantitative cultures must be done.	Supportive care. Antibiotics not indicated.
Enterohemorrhagic *E. coli* (EHEC) including *E. coli* O157:H7 and other Shiga toxin-producing *E. coli* (STEC)	1–8 days	Severe diarrhea that is often bloody, abdominal pain and vomiting. Usually, little or no fever is present. More common in children <4 years.	5–10 days	Undercooked beef especially hamburger, unpasteurized milk and juice, raw fruits and vegetables (eg. sprouts), salami (rarely), and contaminated water.	Stool culture; *E. coli* O157:H7 requires special media to grow. If *E. coli* O157:H7 is suspected, specific testing must be requested. Shiga toxin testing may be done using commercial kits; positive isolates should be forwarded to public health laboratories for confirmation and serotyping.	Supportive care, monitor renal function, hemoglobin, and platelets closely. *E. coli* O157:H7 infection is also associated with hemolytic uremic syndrome (HUS), which can cause lifelong complications. Studies indicate that antibiotics may promote the development of HUS.

Foodborne Illnesses (Bacterial) (*Continued*)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Enterotoxigenic *E. coli* (ETEC)	1–3 days	Watery diarrhea, abdominal cramps, some vomiting.	3 to >7 days	Water or food contaminated with human feces.	Stool culture. ETEC requires special laboratory techniques for identification. If suspected, must request specific testing.	Supportive care. Antibiotics are rarely needed except in severe cases. Recommended antibiotics include TMP-SMX and quinolones.
Listeria monocytogenes	9–48 hrs for gastrointestinal symptoms, 2–6 weeks for invasive disease	Fever, muscle aches, and nausea or diarrhea. Pregnant women may have mild flu-like illness, and infection can lead to premature delivery or stillbirth. Elderly or immunocompromised patients may have bacteremia or meningitis.	Variable	Fresh soft cheeses, unpasteurized milk, inadequately pasteurized milk, ready-to-eat deli meats, hot dogs.	Blood or cerebrospinal fluid cultures. Asymptomatic fecal carriage occurs; therefore, stool culture usually not helpful. Antibody to listerolysin O may be helpful to identify outbreak retrospectively.	Supportive care and antibiotics; Intravenous ampicillin, penicillin, or TMP-SMX are recommended for invasive disease.
	At birth and infancy	Infants infected from mother at risk for sepsis or meningitis.				
Salmonella spp.	1–3 days	Diarrhea, fever, abdominal cramps, vomiting. *S.* Typhi and *S.* Paratyphi produce typhoid with insidious onset characterized by fever, headache, constipation, malaise, chills, and myalgia; diarrhea is uncommon, and vomiting is not usually severe.	4–7 days	Contaminated eggs, poultry, unpasteurized milk or juice, cheese, contaminated raw fruits and vegetables (alfalfa sprouts, melons). *S.* Typhi epidemics are often related to fecal contamination of water supplies or street-vended foods.	Routine stool cultures.	Supportive care. Other than for *S.* Typhi and *S.* Paratyphi, antibiotics are not indicated unless there is extra-intestinal spread, or the risk of extra-intestinal spread, of the infection. Consider ampicillin, gentamicin, TMP-SMX, or quinolones if indicated. A vaccine exists for *S.* Typhi.
Shigella spp.	24–48 hrs	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus.	4–7 days	Food or water contaminated with human fecal material. Usually person-to-person spread, fecal–oral transmission. Ready-to-eat foods touched by infected food workers, eg, raw vegetables, salads, sandwiches.	Routine stool cultures.	Supportive care. TMP-SMX recommended in the US if organism is susceptible; nalidixic acid or other quinolones may be indicated if organism is resistant, especially in developing countries.
Staphylococcus aureus (preformed enterotoxin)	1–6 hrs	Sudden onset of severe nausea and vomiting. Abdominal cramps. Diarrhea and fever may be present.	24–48 hrs	Unrefrigerated or improperly refrigerated meats, potato and egg salads, cream pastries.	Normally a clinical diagnosis. Stool, vomitus, and food can be tested for toxin and cultured if indicated.	Supportive care.
Vibrio cholerae (toxin)	24–72 hrs	Profuse watery diarrhea and vomiting, which can lead to severe dehydration and death within hours.	3–7 days. Causes life-threatening dehydration.	Contaminated water, fish, shellfish, street-vended food typically from Latin America or Asia.	Stool culture; *Vibrio cholerae* requires special media to grow. If *V. cholerae* is suspected, must request specific testing.	Supportive care with aggressive oral and intravenous rehydration. In cases of confirmed cholera, tetracycline or doxycycline is recommended for adults, and TMP-SMX for children (<8 years).
Vibrio parahaemolyticus	2–48 hrs	Watery diarrhea, abdominal cramps, nausea, vomiting.	2–5 days	Undercooked or raw seafood, such as fish, shellfish.	Stool cultures. *Vibrio parahaemolyticus* requires special media to grow. If *V. parahaemolyticus* is suspected, must request specific testing.	Supportive care. Antibiotics are recommended in severe cases: tetracycline, doxycycline, gentamicin, and cefotaxime.
Vibrio vulnificus	1–7 days	Vomiting, diarrhea, abdominal pain, bacteremia, and wound infections. More common in the immunocompromised, or in patients with chronic liver disease (presenting with bullous skin lesions). Can be fatal in patients with liver disease and the immunocompromised.	2–8 days	Undercooked or raw shellfish, especially oysters, other contaminated seafood, and open wounds exposed to sea water.	Stool, wound, or blood cultures. *Vibrio vulnificus* requires special media to grow. If *V. vulnificus* is suspected, must request specific testing.	Supportive care and antibiotics; tetracycline, doxycycline, and ceftazidime are recommended.

Foodborne Illnesses (Bacterial) (*Continued*)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Yersinia enterocolytica and *Y. pseudotuberculosis*	24–48 hrs	Appendicitis-like symptoms (diarrhea and vomiting, fever, and abdominal pain) occur primarily in older children and young adults. May have a scarlitiniform rash with *Y. pseudotuberculosis.*	1–3 weeks, usually self-limiting	Undercooked pork, unpasteurized milk, tofu, contaminated water. Infection has occurred in infants whose caregivers handled chitterlings.	Stool, vomitus, or blood culture. *Yersinia* requires special media to grow. If suspected, must request specific testing. Serology is available in research and reference laboratories.	Supportive care. If septicemia or other invasive disease occurs, antibiotic therapy with gentamicin or cefotaxime (doxycycline and ciprofloxacin also effective).

Foodborne Illnesses (Viral)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Hepatitis A	28 days average (15–50 days)	Diarrhea, dark urine, jaundice, and flu-like symptoms, i.e., fever, headache, nausea, and abdominal pain.	Variable, 2 weeks – 3 months	Shellfish harvested from contaminated waters, raw produce, contaminated drinking water, uncooked foods and cooked foods that are not reheated after contact with infected food handler.	Increase in ALT, bilirubin. Positive IgM and anti-hepatitis A antibodies.	Supportive care. Prevention with immunization.
Noroviruses (and other caliciviruses)	12–48 hrs	Nausea, vomiting, abdominal cramping, diarrhea, fever, myalgia, and some headache. Diarrhea is more prevalent in adults and vomiting is more prevalent in children.	12–60 hrs	Shellfish, fecally contaminated foods, ready-to-eat foods touched by infected food workers (salads, sandwiches, ice, cookies, fruit).	Routine RT-PCR and EM on fresh unpreserved stool samples. Clinical diagnosis, negative bacterial cultures. Stool is negative for WBCs.	Supportive care such as rehydration. Good hygiene.
Rotavirus	1–3 days	Vomiting, watery diarrhea, low-grade fever. Temporary lactose intolerance may occur. Infants and children, elderly, and immunocompromised are especially vulnerable.	4–8 days	Fecally contaminated foods. Ready-to-eat foods touched by infected food workers (salads, fruits).	Identification of virus in stool via immunoassay.	Supportive care. Severe diarrhea may require fluid and electrolyte replacement.
Other viral agents (astroviruses, adenoviruses, parvoviruses)	10–70 hrs	Nausea, vomiting, diarrhea, malaise, abdominal pain, headache, fever.	2–9 days	Fecally contaminated foods. Ready-to-eat foods touched by infected food workers. Some shellfish.	Identification of the virus in early acute stool samples. Serology. Commercial ELISA kits are now available for adenoviruses and astroviruses.	Supportive care, usually mild, self-limiting. Good hygiene.

Foodborne Illnesses (Parasitic)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Angiostrongylus cantonensis	1 week to ≥1 month	Severe headaches, nausea, vomiting, neck stiffness, paresthesias, hyperesthesias, seizures, and other neurologic abnormalities.	Several weeks to several months	Raw or undercooked intermediate hosts (eg, snails or slugs), infected paratenic (transport) hosts (eg, crabs, fresh water shrimp), fresh produce contaminated with intermediate or transport hosts.	Examination of CSF for elevated pressure, protein, leukocytes, and eosinophils; serologic testing using ELISA to detect antibodies to *Angiostrongylus cantonensis.*	Supportive care. Repeat lumbar punctures and use of corticosteroid therapy may be used for more severely ill patients.
Cryptosporidium	2–10 days	Diarrhea (usually watery), stomach cramps, upset stomach, slight fever.	May be remitting and relapsing over weeks to months	Any uncooked food or food contaminated by an ill food handler after cooking, drinking water.	Request specific examination of the stool for *Cryptosporidium.* May need to examine water or food.	Supportive care, self-limited. If severe consider paromomycin for 7 days. For children aged 1–11 years, consider nitazoxanide for 3 days.
Cyclospora cayetanensis	1–14 days, usually at least 1 week	Diarrhea (usually watery), loss of appetite, substantial loss of weight, stomach cramps, nausea, vomiting, fatigue.	May be remitting and relapsing over weeks to months	Various types of fresh produce (imported berries, lettuce).	Request specific examination of the stool for *Cyclospora.* May need to examine water or food.	TMP-SMX for 7 days.

Foodborne Illnesses (Parasitic) (*Continued*)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Entamoeba histolytica	2–3 days to 1–4 weeks	Diarrhea (often bloody), frequent bowel movements, lower abdominal pain.	May be protracted (several weeks to several months)	Any uncooked food or food contaminated by an ill food handler after cooking, drinking water.	Examination of stool for cysts and parasites—may need at least 3 samples. Serology for long-term infections.	Metronidazole and a luminal agent (iodoquinol or paromomycin).
Giardia lamblia	1–2 weeks	Diarrhea, stomach cramps, gas.	Days to weeks	Any uncooked food or food contaminated by an ill food handler after cooking, drinking water.	Examination of stool for ova and parasites — may need at least 3 samples.	Metronidazole.
Toxoplasma gondii	5–23 days	Generally asymptomatic, 20% may develop cervical lymphadenopathy and/or a flu-like illness. In immunocompromised patients: central nervous system (CNS) disease, myocarditis, or pneumonitis is often seen.	Months	Accidental ingestion of contaminated substances (eg, soil contaminated with cat feces on fruits and vegetables), raw or partly cooked meat (especially pork, lamb, or venison).	Isolation of parasites from blood or other body fluids; observation of parasites in patient specimens via microscopy or histology. Detection of organisms is rare; serology (reference laboratory needed) can be a useful adjunct in diagnosing toxoplasmosis. However, IgM antibodies may persist for 6–18 months and thus may not necessarily indicate recent infection. PCR of bodily fluids. For congenital infection: isolation of *T. gondii* from placenta, umbilical cord, or infant blood. PCR of white blood cells, CSF, or amniotic fluid, or IgM and IgA serology, performed by a reference laboratory.	Asymptomatic healthy, but infected, persons do not require treatment. Spiramycin or pyrimethamine plus sulfadiazine may be used for pregnant women. Pyrimethamine plus sulfadiazine may be used for immunocompromised persons, in specific cases. Pyrimethamine plus sulfadiazine (with or without steroids) may be given for ocular disease when indicated. Folinic acid is given with pyrimethamine plus sulfadiazine to counteract bone marrow suppression.
Toxoplasma gondii (congenital infection)	In infants at birth	Treatment of the mother may reduce severity and/or incidence of congenital infection. Most infected infants have few symptoms at birth. Later, they will generally develop signs of congenital toxoplasmosis (mental retardation, severely impaired eyesight, cerebral palsy, seizures), unless the infection is treated.	Months	Passed from mother (who acquired acute infection during pregnancy) to child.		
Trichinella spiralis	1–2 days for initial symptoms; others begin 2–8 weeks after infection	Acute: nausea, diarrhea, vomiting, fatigue, fever, abdominal discomfort followed by muscle soreness, weakness, and occasional cardiac and neurologic complications.	Months	Raw or undercooked contaminated meat, usually pork or wild game meat (eg, bear or moose).	Positive serology or demonstration of larvae via muscle biopsy. Increase in eosinophils.	Supportive care plus mebendazole or albendazole.

Foodborne Illnesses (Noninfectious)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Antimony	5 min – 8 hrs. usually <1 hr	Vomiting, metallic taste.	Usually self-limited	Metallic container.	Identification of metal in beverage or food.	Supportive care.
Arsenic	Few hrs	Vomiting, colic, diarrhea.	Several days	Contaminated food.	Urine. May cause eosinophilia.	Gastric lavage, BAL (dimercaprol).
Cadmium	5 min – 8 hrs. usually <1 hr	Nausea, vomiting, myalgia, increase in salivation, stomach pain.	Usually self-limited	Seafood, oysters, clams, lobster, grains, peanuts.	Identification of metal in food.	Supportive care.
Ciguatera fish poisoning (ciguatera toxin)	2–6 hrs 3 hrs 2–5 days	GI: abdominal pain, nausea, vomiting, diarrhea. Neurologic: paresthesias, reversal of hot or cold, pain, weakness. Cardiovascular: bradycardia, hypotension, increase in T wave abnormalities.	Days to weeks to months	A variety of large reef fish. Grouper, red snapper, amberjack, and barracuda (most common).	Radioassay for toxin in fish or a consistent history.	Supportive care, IV mannitol. Children more vulnerable.
Copper	5 min – 8 hrs. usually <1 hr	Nausea, vomiting, blue or green vomitus.	Usually self-limited	Metallic container.	Identification of metal in beverage or food.	Supportive care.
Mercury	1 week or longer	Numbness, weakness of legs, spastic paralysis, impaired vision, blindness, coma. Pregnant women and the developing fetus are especially vulnerable.	May be protracted	Fish exposed to organic mercury, grains treated with mercury fungicides.	Analysis of blood, hair.	Supportive care.
Mushroom toxins, short-acting (muscinol, muscarine, psilocybin, coprius artemetaris, ibotenic acid)	<2 hrs	Vomiting, diarrhea, confusion, visual disturbance, salivation, diaphoresis, hallucinations, disulfiram-like reaction, confusion, visual disturbance.	Self-limited	Wild mushrooms (cooking may not destroy these toxins).	Typical syndrome and mushroom identified or demonstration of the toxin.	Supportive care.
Mushroom toxin, long-acting (amanitin)	4–8 hrs diarrhea; 24–48 hrs liver failure	Diarrhea, abdominal cramps, leading to hepatic and renal failure.	Often fatal	Mushrooms.	Typical syndrome and mushroom identified and/or demonstration of the toxin.	Supportive care, life-threatening, may need life support.
Nitrite poisoning	1–2 hrs	Nausea, vomiting, cyanosis, headache, dizziness, weakness, loss of consciousness, chocolate-brown colored blood.	Usually self-limited	Cured meats, any contaminated foods, spinach exposed to excessive nitrification.	Analysis of the food, blood.	Supportive care, methylene blue.
Pesticides (organophosphates or carbamates)	Few min to few hrs	Nausea, vomiting, abdominal cramps, diarrhea, headache, nervousness, blurred vision, twitching, convulsions, salivation and meiosis.	Usually self-limited	Any contaminated food.	Analysis of the food, blood.	Atropine; 2-PAM (Pralidoxime) is used when atropine is not able to control symptoms and is rarely necessary in carbamate poisoning.
Puffer fish (tetrodotoxin)	<30 min	Parasthesias, vomiting, diarrhea, abdominal pain, ascending paralysis, respiratory failure.	Death usually in 4–6 hours	Puffer fish.	Detection of tetrodotoxin in fish.	Life-threatening, may need respiratory support.
Scombroid (histamine)	1 min – 3 hrs	Flushing, rash, burning sensation of skin, mouth and throat, dizziness, uriticaria, parasthesias.	3–6 hrs	Fish: bluefin, tuna, skipjack, mackerel, marlin, escolar, and mahi mahi.	Demonstration of histamine in food or clinical diagnosis.	Supportive care, antihistamines.

Foodborne Illnesses (Noninfectious) (*Continued*)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Shellfish toxins (diarrheic, neurotoxic, amnesic)	Diarrheic shellfish poisoning (DSP) — 30 min to 2 hrs	Nausea, vomiting, diarrhea, and abdominal pain accompanied by chills, headache, and fever.	Hrs to 2–3 days	A variety of shellfish, primarily mussels, oysters, scallops, and shellfish from the Florida coast and the Gulf of Mexico.	Detection of the toxin in shellfish; high-pressure liquid chromatography.	Supportive care, generally self-limiting. Elderly are especially sensitive to ASP.
	Neurotoxic shellfish poisoning (NSP) — few min to hours	Tingling and numbness of lips, tongue, and throat, muscular aches, dizziness, reversal of the sensations of hot and cold, diarrhea, and vomiting.				
	Amnesic shellfish poisoning (ASP) — 24–48 hrs	Vomiting, diarrhea, abdominal pain and neurologic problems such as confusion, memory loss, disorientation, seizure, coma.				
Shellfish toxins (paralytic shellfish poisoning)	30 min – 3 hrs	Diarrhea, nausea, vomiting leading to parasthesias of mouth, lips, weakness, dysphasia, dysphonia, respiratory paralysis.	Days	Scallops, mussels, clams, cockles.	Detection of toxin in food or water where fish are located; high-pressure liquid chromatography.	Life-threatening, may need respiratory support.
Sodium fluoride	Few min to 2 hrs	Salty or soapy taste, numbness of mouth, vomiting, diarrhea, dilated pupils, spasms, pallor, shock, collapse.	Usually self-limited	Dry foods (eg, dry milk, flour, baking powder, cake mixes) contaminated with sodium fluoride–containing insecticides and rodenticides.	Testing of vomitus or gastric washings. Analysis of the food.	Supportive care.
Thallium	Few hrs	Nausea, vomiting, diarrhea, painful parathesias, motor polyneuropathy, hair loss.	Several days	Contaminated food.	Urine, hair.	Supportive care.
Tin	5 min – 8 hrs. usually <1 hr	Nausea, vomiting, diarrhea.	Usually self-limited	Metallic container.	Analysis of the food.	Supportive care.
Vomitoxin	Few min to 3 hrs	Nausea, headache, abdominal pain, vomiting.	Usually self-limited	Grains such as wheat, corn, barley.	Analysis of the food.	Supportive care.
Zinc	Few hrs	Stomach cramps, nausea, vomiting, diarrhea, myalgias.	Usually self-limited	Metallic container.	Analysis of the food, blood and feces, saliva or urine.	Supportive care.

G.3 Guidelines for Laboratory Confirmation of a Foodborne Disease Outbreak

Taken from Centers for Disease Control and Prevention. "Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and other Health Care Professionals." *MMWR* 2001:50 (No. RR-2).

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
Bacterial			
1. *Bacillus cereus*			
a. Vomiting toxin	1–6 hrs	Vomiting; some patients with diarrhea; fever uncommon	Isolation of organism from stool of two or more ill persons and not from stool of control patients OR Isolation of 10^5 organisms/g from epidemiologically implicated food, provided specimen is properly handled
b. Diarrheal toxin	6–24 hrs	Diarrhea, abdominal cramps, and vomiting in some patients; fever uncommon	Isolation of organism from stool of two or more ill persons and not from stool of control patients OR Isolation of 10^5 organisms/g from epidemiologically implicated food, provided specimen is properly handled
2. *Brucella*	Several days to several mos; usually >30 days	Weakness, fever, headache, sweats, chills, arthralgia, weight loss, splenomegaly	Two or more ill persons and isolation of organism in culture of blood or bone marrow; greater than fourfold increase in standard agglutination titer (SAT) over several wks, or single SAT 1:160 in person who has compatible clinical symptoms and history of exposure
3. *Campylobacter jejuni/coli*	2–10 days; usually 2–5 days	Diarrhea (often bloody), abdominal pain, fever	Isolation of organism from clinical specimens from two or more ill persons OR Isolation of organism from epidemiologically implicated food

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
4. *Clostridium botulinum*	2 hrs–8 days; usually 12–48 hrs	Illness of variable severity; common symptoms are diplopia, blurred vision, and bulbar weakness; paralysis, which is usually descending and bilateral, might progress rapidly	Detection of botulinal toxin in serum, stool, gastric contents, or implicated food OR Isolation or organism from stool or intestine
5. *Clostridium perfringens*	6–24 hrs	Diarrhea, abdominal cramps; vomiting and fever uncommon	Isolation of 10^5 organisms/g from stool of two or more ill persons, provided specimen is properly handled. OR Demonstration of enterotoxin in the stool of two or more ill persons OR Isolation of 10^5 organisms/g from epidemiologically implicated food, provided specimen is properly handled
6. *Escherichia coli*			
a. Enterohemorrhagic (*E. coli* O157:H7 and others)	1–10 days; usually 3–4 days	Diarrhea (often bloody), abdominal cramps (often severe), little or no fever	Isolation of *E. coli* O157:H7 or other Shiga-like toxin-producing *E. coli* from clinical specimen from two or more ill persons OR Isolation of *E. coli* O157:H7 or other Shiga-like toxin-producing *E. coli* from epidemiologically implicated food
b. Enterotoxigenic (ETEC)	6–48 hrs	Diarrhea, abdominal cramps, nausea; vomiting and fever less common	Isolation of organism of same serotype, demonstrated to produce heat-stable (ST) and/or heat-labile (LT) enterotoxin, from stool of two or more ill persons
c. Enteropathogenic (EPEC)	Variable	Diarrhea, fever, abdominal cramps	Isolation of organism of same enteropathogenic serotype from stool of two or more ill persons

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
d. Enteroinvasive (EIEC)	Variable	Diarrhea (might be bloody), fever, abdominal cramps	Isolation of same enteroinvasive serotype from stool of two or more ill persons
7. *Listeria monocytogenes*			
a. Invasive disease	2–6 wks	Meningitis, neonatal sepsis, fever	Isolation of organism from normally sterile site
b. Diarrheal disease	Unknown	Diarrhea, abdominal cramps, fever	Isolation of organism of same serotype from stool of two or more ill persons exposed to food that is epidemiologically implicated or from which organism of same serotype has been isolated
8. Nontyphoidal *Salmonella*	6 hrs–10 days; usually 6–48 hrs	Diarrhea, often with fever and abdominal cramps	Isolation of organism of same serotype from clinical specimens from two or more ill persons OR Isolation of organism from epidemiologically implicated food
9. *Salmonella* Typhi	3–60 days; usually 7–14 days	Fever, anorexia, malaise, headache, and myalgia; sometimes diarrhea or constipation	Isolation of organism from clinical specimens from two or more ill persons OR Isolation of organism from epidemiologically implicated food
10. *Shigella* spp.	12 hrs–6 days; usually 2–4 days	Diarrhea (often bloody), often accompanied by fever and abdominal cramps	Isolation of organism of same serotype from clinical specimens from two or more ill persons OR Isolation of organism from epidemiologically implicated food

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
11. *Staphylococcus aureus*	30 min–8 hrs; usually 2–4 hrs	Vomiting, diarrhea	Isolation of organism of same phage type from stool or vomitus of two or more ill persons OR Detection of enterotoxin in epidemiologically implicated food OR Isolation of 10^5 organisms/g from epidemiologically implicated food, provided specimen is properly handled
12. *Streptococcus,* group A	1–4 days	Fever, pharyngitis, scarlet fever, upper respiratory infection	Isolation of organism of same M- or T-type from throats of two or more ill persons OR Isolation of organism of same M- or T-type from epidemiologically implicated food
13. *Vibrio cholerae*			
a. O1 or O139	1–5 days	Watery diarrhea, often accompanied by vomiting	Isolation of toxigenic organism from stool or vomitus of two or more ill persons OR Significant rise in vibriocidal, bacterial-agglutinating, or antitoxin antibodies in acute- and early convalescent-phase sera among persons not recently immunized OR Isolation of toxigenic organism from epidemiologically implicated food
b. non-O1 and non-O139	1–5 days	Watery diarrhea	Isolation of organism of same serotype from stool of two or more ill persons

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
14. *Vibrio parahaemolyticus*	4–30 hrs	Diarrhea	Isolation of Kanagawa-positive organism from stool of two or more ill persons OR Isolation of 10^5 Kanagawa-positive organisms/g from epidemiologically implicated food, provided specimen is properly handled
15. *Yersinia enterocolitica*	1–10 days; usually 4–6 days	Diarrhea, abdominal pain (often severe)	Isolation of organism from clinical specimen from two or more ill persons OR Isolation of pathogenic strain of organism from epidemiologically implicated food
Chemical			
1. Marine toxins			
a. Ciguatoxin	1–48 hrs; usually 2–8 hrs	Usually gastrointestinal symptoms followed by neurologic symptoms (including paresthesia of lips, tongue, throat, or extremities) and reversal of hot and cold sensation	Demonstration of ciguatoxin in epidemiologically implicated fish OR Clinical syndrome among persons who have eaten a type of fish previously associated with ciguatera fish poisoning (e.g., snapper, grouper, or barracuda)
b. Scombroid toxin (histamine)	1 min–3 hrs; usually <1 hr	Flushing, dizziness, burning of mouth and throat, headache, gastrointestinal symptoms, urticaria, and generalized pruritis	Demonstration of histamine in epidemiologically implicated fish OR Clinical syndrome among persons who have eaten a type of fish previously associated with histamine fish poisoning (e.g., mahi-mahi or fish of order Scomboidei)

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
c. Paralytic or neurotoxic shellfish	30 min–3 hrs	Paresthesia of lips, mouth or face, and extremities; intestinal symptoms or weakness, including respiratory difficulty	Detection of toxin in epidemiologically implicated food OR Detection of large numbers of shellfish-poisoning–associated species of dinoflagellates in water from which epidemiologically implicated mollusks are gathered
d. Puffer fish, tetrodotoxin	10 min–3 hrs; usually 10–45 min	Paresthesia of lips, tongue, face, or extremities, often following numbness; loss of proprioception or floating sensations	Demonstration of tetrodotoxin in epidemiologically implicated fish OR Clinical syndrome among persons who have eaten puffer fish
2. Heavy metals • Antimony • Cadmium • Copper • Iron • Tin • Zinc	5 min–8 hrs; usually <1 hr	Vomiting, often metallic taste	Demonstration of high concentration of metal in epidemiologically implicated food
3. Monosodium glutamate (MSG)	3 min–2 hrs; usually <1 hr	Burning sensation in chest, neck, abdomen, or extremities; sensation of lightness and pressure over face or heavy feeling in chest	Clinical syndrome among persons who have eaten food containing MSG (e.g., usually 1.5 g MSG)
4. Mushroom toxins			
a. Shorter-acting toxins	2 hrs	Usually vomiting and diarrhea, other symptoms differ with toxin	Clinical syndrome among persons who have eaten mushroom identified as toxic type OR Demonstration of toxin in epidemiologically implicated mushroom or food containing mushroom
• Muscimol		• Confusion, visual disturbance	
• Muscarine		• Salivation, diaphoresis	
• Psilocybin		• Hallucinations	
• *Coprinus artrementaris*		• Disulfiram-like reaction	
• Ibotenic acid		• Confusion, visual disturbance	

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
b. Longer-acting toxins (e.g., *Amanita* spp.)	6–24 hrs	Diarrhea and abdominal cramps for 24 hrs followed by hepatic and renal failure	Clinical syndrome among persons who have eaten mushroom identified as toxic type OR Demonstration of toxin in epidemiologically implicated mushroom or food containing mushrooms
Parasitic			
1. *Cryptosporidium parvum*	2–28 days; median: 7 days	Diarrhea, nausea, vomiting; fever	Demonstration of organism or antigen in stool or in small-bowel biopsy of two or more ill persons OR Demonstration of toxin in epidemiologically implicated food
2. *Cyclospora cayetanensus*	1–11 days; median: 7 days	Fatigue, protracted diarrhea, often relapsing	Demonstration of organism in stool of two or more ill persons
3. *Giardia lamblia*	3–25 days; median: 7 days	Diarrhea, gas, cramps, nausea, fatigue	Two or more ill persons and detection of antigen in stool or demonstration of organism in stool, duodenal contents, or small-bowel biopsy specimen
4. *Trichinella* spp.	1–2 days for intestinal phase; 2–4 wks for systemic phase	Fever, myalgia, periorbital edema, high eosinophil count	Two or more ill persons and positive serologic test or demonstration of larvae in muscle biopsy OR Demonstration of larvae in epidemiologically implicated meat

Etiologic agent	Incubation period	Clinical syndrome	Confirmation
Viral			
1. Hepatitis A	15–50 days; median: 28 days	Jaundice, dark urine, fatigue, anorexia, nausea	Detection of immunoglobulin M anti-hepatitis A virus in serum from two or more persons who consumed epidemiologically implicated food
2. Norwalk family of viruses, small round-structured viruses (SRSV)	15–77 hrs; usually 24–48 hrs	Vomiting, cramps, diarrhea, headache	More than fourfold rise in antibody titer to Norwalk virus or Norwalk-like virus in acute and convalescent sera in most serum pairs OR Visualization of small, round-structured viruses that react with patient's convalescent sera but not acute sera — by immune-electron microsopy (assays based on molecular diagnostics [e.g., polymerase-chain reaction, probes, or assays for antigen and antibodies from expressed antigen] are available in reference laboratories)
3. Astrovirus, calicivirus, others	15–77 hrs; usually 24–48 hrs	Vomiting, cramps, diarrhea, headache	Visualization of small, round-structured viruses that react with patient's convalescent sera but not acute sera — by immune-electron microsopy (assays based on molecular diagnostics [e.g., polymerase-chain reaction, probes, or assays for antigen and antibodies from expressed antigen] are available in reference laboratories)

APPENDIX H
Foodborne Illness Complaint Worksheet used by Food Inspectors

H.1 Foodborne Illness Investigation Form 910

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

FPCS -910
1/02

Foodborne Illness Investigation Report

Date Received: _____ Occurrence Date: _____

Event Location: _____ City: _____ County: _____

Establishment Food Prepared At: _____ ID#: _____

How Many People Served: _____ Number Reported Ill: _____

Time Food Consumed: _____ Time of Onset (AM/PM): _____

Symptoms:

❑ Nausea ❑ Vomiting ❑ Diarrhea ❑ Bloody Diarrhea ❑ Fever ❑ Abdominal Pain ❑ Dizziness

❑ Blurred Vision ❑ Headache ❑ Other: _____

Suspected Foods: _____

_____

Samples Taken? ❑ Yes ❑ No Date Samples Sent To Lab: _____

Name of EPI Contact: _____ Time: _____ Date: _____

Date HACCP Inspection Conducted: _____ Date HACCP Scheduled: _____

Comments: _____

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Inspector: _____ Investigation Date: _____

Travel Time: _____ Total Investigation Time: _____

Original–KDHE Topeka

APPENDIX I
Infected Food Handlers

I.1 Exclusion and Restriction Requirements for Infected Food handlers
I.2 Removal of Exclusion and Restriction Requirements for Infected Food handlers

EXCLUSION AND RESTRICTION REQUIREMENTS FOR INFECTED FOODHANDLERS

Food handlers with specific diseases or health conditions should be excluded and restricted according to the following requirements. These requirements are based on the 1999 Kansas Food Code. Such

Health Status of Food handler	Facilities Serving Highly Susceptible Population[†]T	Facilities Not Serving Highly Susceptible Population
Diagnosed with illness due to *Salmonella* Typhi, *Shigella spp.*, Shiga toxin-producing *Escherchia coli*, or hepatitis A virus	EXCLUDE	EXCLUDE
Experiencing one of the following symptoms: diarrhea, fever, vomiting, jaundice, sore through with fever *OR* experiencing an uncovered lesion containing pus on the hands or wrists, exposed portions of arms, or other parts of the body	RESTRICT	RESTRICT
Experiencing one of the following symptoms and meets a high-risk condition[‡]: diarrhea, fever, vomiting, jaundice, sore throat with fever	EXCLUDE	RESTRICT
Asymptomatic but stools positive for *S.* Typhi, *Shigella spp.*, or Shiga toxin-producing E. coli	EXCLUDE	RESTRICT
Past illness from *Salmonella* Typhi within the last 3 months	EXCLUDE	NO RESTRICTIONS
Past illness from *Shigella spp*. or Shiga toxin-producing *Escherichia coli* within the last month	EXCLUDE	NO RESTRICTIONS
Onset of jaundice within the last 14 days	EXCLUDE	EXCLUDE
Onset of jaundice more than 14 days before	EXCLUDE	RESTRICT

[†] A group of persons who are more likely than other populations to experience foodborne disease because they are immunocompromised or older adults and in a facility that provides health care or assisted living services, such as a hospital or nursing home; or preschool age children in a facility that provides custodial care, such as a day care center.

[‡] A food handler with high-risk conditions refers to a food handler who (1) prepared or consumed food that caused disease, lives with an ill person, or lives with a person associated with a disease outbreak. The diseases of concern include *S. typhi*, *Shigella spp*., Shiga-toxin producing *E. coli*, or hepatitis A virus.

REMOVAL OF EXCLUSION AND RESTRICTION REQUIREMENTS FOR FOODHANDLERS

Infected food handlers who have been restricted or excluded may be removed from such requirements after the following criteria are met. These requirements are based on the 1999 Kansas Food Code.

Health Status of Food handler	Facilities Serving Highly Susceptible Population[†]	Facilities Not Serving Highly Susceptible Population
Diagnosed with illness due to *Salmonella* Typhi	▪ Approval from regulatory authority *and* ▪ Written medical documentation of 3 consecutive negative stools taken 1 month after onset, 48 hours after discontinuance of antibiotics, and 24 hours apart	▪ Approval from regulatory authority *and* ▪ Written medical documentation of 3 consecutive negative stools taken 1 month after onset, 48 hours after discontinuance of antibiotics, and 24 hours apart
Diagnosed with illness due to *Shigella spp.* or Shiga toxin-producing *Escherchia coli*	▪ Approval from regulatory authority *and* ▪ Written medical documentation of 2 consecutive negative stools taken 48 hours after discontinuance of antibiotics and 24 hours apart	▪ Approval from regulatory authority *and* ▪ Written medical documentation of 2 consecutive negative stools taken 48 hours after discontinuance of antibiotics and 24 hours apart
Diagnosed with illness due to hepatitis A virus	▪ Approval from regulatory authority *and* ▪ Written medical documentation that person is free of symptoms or has 2 blood tests demonstrating falling liver enzymes	▪ Approval from regulatory authority *and* ▪ Written medical documentation that person is free of symptoms or has 2 blood tests demonstrating falling liver enzymes
Experiencing one of the following symptoms: diarrhea, fever, vomiting, jaundice, sore through with fever *OR* experiencing an uncovered lesion containing pus on the hands or wrists, exposed portions of arms, or other parts of the body	▪ Person is free of symptoms and no illnesses resulted *and* ▪ Written medical documentation that person is free of symptoms, free of infectious agent, or has noninfectious condition	▪ Person is free of symptoms and no illnesses resulted *and* ▪ Written medical documentation that person is free of symptoms, free of infectious agent, or has noninfectious condition

[†] A group of persons who are more likely than other populations to experience foodborne disease because they are immunocompromised or older adults and in a facility that provides health care or assisted living services, such as a hospital or nursing home; or preschool age children in a facility that provides custodial care, such as a day care center.

REMOVAL OF EXCLUSION AND RESTRICTION REQUIREMENTS FOR FOODHANDLERS (continued)

Health Status of Food handler	Facilities Serving Highly Susceptible Population[†]	Facilities Not Serving Highly Susceptible Population
Experiencing one of the following symptoms and meets a high-risk condition[‡]: diarrhea, fever, vomiting, jaundice, sore throat with fever	▪ Written medical documentation that person is free of infectious agent, is free of jaundice, or has noninfectious condition	▪ Written medical documentation that person is free of infectious agent, is free of jaundice, or has noninfectious condition
Asymptomatic but stools positive for *S.* Typhi, *Shigella spp.*, or Shiga toxin-producing E. coli	▪ Written medical documentation that person is free of infectious agent	▪ Written medical documentation that person is free of infectious agent
Past illness from Salmonella Typhi within the last three months	▪ Written medical documentation that person is free of infectious agent	NA
Past illness from Shigella spp. Or Shiga toxin-producing Escherichia coli within the last month	▪ Written medical documentation that person is free of infectious agent	NA
Onset of jaundice within the last 14 days	▪ No illnesses resulted *and* ▪ Written medical documentation that person is free of hepatitis A or has 2 blood tests demonstrating falling liver enzymes	▪ No illnesses resulted *and* ▪ Written medical documentation that person is free of hepatitis A or has 2 blood tests demonstrating falling liver enzymes
Onset of jaundice more than 14 days before	▪ Until 2 weeks after onset of symptoms *and* ▪ Written medical documentation that person is free of hepatitis A or has 2 blood tests demonstrating falling liver enzymes	▪ Until 2 weeks after onset of symptoms *and* ▪ Written medical documentation that person is free of hepatitis A or has 2 blood tests demonstrating falling liver enzymes

[†] A group of persons who are more likely than other populations to experience foodborne disease because they are immunocompromised or older adults and in a facility that provides health care or assisted living services, such as a hospital or nursing home; or preschool age children in a facility that provides custodial care, such as a day care center.

[‡] A food handler with high-risk conditions refers to a food handler who (1) prepared or consumed food that caused disease, lives with an ill person, or lives with a person associated with a disease outbreak. The diseases of concern include *S. typhi*, *Shigella spp*., Shiga-toxin producing *E. coli*, or hepatitis A virus.

APPENDIX J
Hazard Analysis Critical Control Points (HACCP)

J.1 Overview and HACCP Inspections

HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP)

Overview

Hazard Analysis and Critical Control Point, or HACCP (pronounced HAS-SIP), is a systematic, science-based approach of identifying, evaluating, and controlling food safety hazards[†]. Initially developed to keep food safe for astronauts within the space program, this approach was adopted by the Food and Drug Administration and the U.S. Department of Agriculture as a means of ensuring a safe food supply from harvest to consumption. Currently, the seafood industry, juice industry, and meat and poultry processing plants are required to follow a HACCP plan, or a written documentation of all food processing and handling procedures. A number of food companies in the U. S. have also adopted a HACCP plan in their manufacturing processes.

The following table lists the seven fundamental HACCP principles.

HACCP Principles[†]

1. Conduct a hazard analysis
2. Identify the critical control points (CCP)
3. Establish critical limits for each CCP
4. Establish monitoring procedures
5. Establish corrective actions
6. Establish recordkeeping procedures
7. Establish verification procedures

PRINCIPLE #1: Conduct a hazard analysis

A hazard analysis is the identification of (1) potential biological, chemical, or physical threats to food and (2) preventative measures that may be implemented to control such threats. Examples of common hazards include microorganisms naturally found in meat or poultry products (i.e. *Campylobacter*, *Salmonella*), chemicals that are unintentionally added to food (i.e. pesticides, cleaners), or foreign materials that are accidentally found in food (i.e. metal, plastic).

PRINCIPLE #2: Identify the critical control points (CCPs)

A critical control point (CCP) refers to a point, step, or procedure in the food process during which control measures may be applied to prevent, eliminate, or reduce hazards. An example of a CCP is the procedure of cooking poultry to 165º F to destroy microorganisms that may be present.

PRINCIPLE #3: Establish critical limits for each CCP

Critical limits are defined as the maximum or minimum value at which a biological, chemical, or physical hazard must be controlled at a given CCP to ensure food safety. An example of a critical limit includes holding temperatures, such as the minimum hot holding temperature of 140º F or the maximum cold holding temperature of 41º F.

[†] FDA. *HACCP: A State-of-the-Art Approach to Food Safety*. http://www.cfsan.fda.gov/~lrd/bghaccp.html

PRINCIPLE #4: Establish monitoring procedures
Monitoring procedures are those procedures that check, measure, and document the food process at a given CCP. An example of a monitoring procedure is the routine observation and recording of cooking times and temperatures.

PRINCIPLE #5: Establish corrective actions
When deviations or problems are identified through monitoring, corrective actions are initiated. An example of a corrective action is the disposing of food if the minimum cooking temperature is not met.

PRINCIPLE #6: Establish recordkeeping procedures
Recordkeeping is essential for the documentation of monitoring procedures, hazards identified, and actions taken to correct potential problems. Moreover, recordkeeping ensures that regulatory requirements are met.

PRINCIPLE #7: Establish verification procedures
Verification procedures are necessary to evaluate a HACCP system and determine if the system is working properly. Verification often involves the testing and reviewing of specific steps, quality control and assurance of equipment and procedures, and annual assessments.

Application of HACCP Principles during an Environmental Investigation

When a foodborne disease outbreak is identified in a food service establishment, food inspectors conduct an inspection that is based on the HACCP principles. Food inspectors follow the food process in the establishment, paying close attention to the preparation of suspect foods or foods implicated in the foodborne disease outbreak.

The following paragraphs describe the general procedures of a HACCP inspection during a foodborne disease outbreak investigation.

Introduction and purpose
Upon arrival at the food service establishment, the inspector should introduce himself to the person in charge and explain the purpose of the inspection.

Identification of ingredients and steps
The inspector should review the menu and identify the ingredients and steps involved in the receiving, storage, preparation and service of suspect food(s). The inspector should obtain recipes for all suspect food(s), identify the ingredients, and collect information about the source. The inspector should also pay close attention to potentially hazardous foods and high-risk preparation factors.

Identify critical control points

Based on the observations made, the inspector should identify critical control points and corrective actions to reduce potential hazards. Microbiological hazards account for the majority of foodborne illness; therefore, emphasis should be placed on contamination, survival, and growth/toxin production risks at these points.

Observe suspect food(s) through establishment

The inspector should observe the suspect food(s) and record the procedures conducted through the operation — from receipt of food from the delivery truck to consumption by the consumer. All risk factors should be observed, including the food source, cooking and holding procedures, potential contamination factors, and poor personal hygiene. Inspectors should have the proper equipment (e.g., thermometers) to assist with these observations. Written documentation on how food(s) were handled and what equipment was used should be completed. Observation and documentation of who handled the food(s) during each preparation step should also be done to help determine if a specific food handler or particular role may have contributed to illness. A flow chart should be developed as a visual tool of the process.

Monitoring and corrective action procedures

Monitoring procedures and corrective actions should be established. These should be discussed in a brief exit interview with the person in charge.

Submit paperwork

Inspectors should write and submit a HACCP inspection report, complete with flow charts, recommendations, and other appropriate paperwork to their supervisor and the epidemiology investigator. Following submission of the report, the inspector should return to the food service establishment to present the report and discuss recommendations with the person in charge.

APPENDIX K
Fact Sheets

Campylobacteriosis

Health Education Facts

How Common is Campylobacteriosis?

Campylobacter is the most common bacterial cause of diarrheal illness in the United States. Many more cases go undiagnosed or unreported, and campylobacteriosis is estimated to affect over 2 million persons every year. Most cases of campylobacteriosis are associated with handling raw poultry or eating raw or undercooked poultry meat. It can also be transmitted from contaminated water or unpasteurized milk. A very small number of Campylobacter organisms (fewer than 500) can cause illness in humans. Even one drop of juice from raw chicken meat can infect a person. The organism is not usually spread from person to person.

What are the Symptoms?

Most people who become ill with campylobacteriosis get diarrhea, cramping, abdominal pain, and fever within 2 to 5 days after exposure to the organism. The diarrhea may be bloody and can be accompanied by nausea and vomiting. The illness typically lasts 1 week. Some persons who are infected with *Campylobacter* don't have any symptoms at all. In persons with compromised immune systems, *Campylobacter* occasionally spreads to the bloodstream and causes a serious life-threatening infection.

The majority of individuals who get campylobacteriosis recover completely within 2 to 5 days, although sometimes recovery can take up to 10 days, although prolonged illnesses and relapses may occur in adults.

Some Tips for Preventing Campylobacteriosis

- Cook all poultry products thoroughly. Make sure that the meat is cooked throughout (no longer pink), any juices run clear, and the inside is cooked to 165ºF
- If you are served undercooked poultry in a restaurant, send it back for further cooking
- Wash hands with soap before, and after, handling raw foods of animal origin
- Use separate cutting boards for foods of animal origin and other foods
- Carefully clean all cutting boards, counter-tops and utensils with soap and hot water after preparing raw food of animal origin
- Avoid consuming unpasteurized milk and untreated surface water
- Make sure that persons with diarrhea, especially children, wash their hands carefully and frequently with soap to reduce the risk of spreading the infection
- Wash hands with soap after having contact with pet feces

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handout #30

E. Coli O157:H7

Health Education Facts

There are hundreds of strains of the bacteria *Escherichia* coli. These strains are commonly found in the intestines of healthy persons and animals. A particular strain, E. coli 0157:H7, also known as 0157, can cause severe illness and even death. First identified as a cause of human illness in 1982, this bacterium is increasingly being detected throughout the developed world.

What are the symptoms?

Persons infected with this type of E. coli can develop severe diarrhea and painful abdominal cramps. The diarrhea is often bloody. For most the illness subsides in five to ten days. However, for some, the infection can lead to a condition known as hemolytic uremic syndrome, WS) in which the kidneys fail, and other complications including seizure and stroke can occur.

E. coli 0157 is the principal cause of HUS, and HUS is the primary cause of acute kidney failure in children. Less than ten percent of the infections lead to HUS, but persons with this illness often require intensive care, blood transfusions and kidney dialysis to survive. Most do survive this condition, but some may have high blood pressure and kidney problems later in life.

Where does E. Coli 0157:H7 come from?

Major sources are undercooked ground beef and raw milk. The 0 157 bacterium is present in the intestines of cattle, which during slaughter may come into contact with the ground meat product. The bacteria are killed when meat is thoroughly cooked, but can survive in meat that is rare or inadequately cooked. The lesson for prevention is to cook ground beef to an internal temperature of at least 155^{o}F.

Bacteria present in the cow's udders or in milking equipment can be passed into raw milk, but pasteurization kills the bacteria.

How else can the bacteria be passed on?

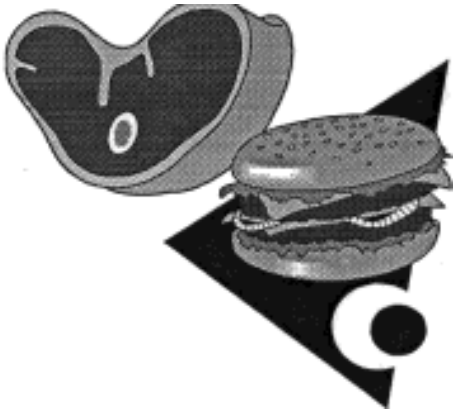
Since waterborne transmission of 0157 has been documented, only chlorinated or carbonated water should be considered safe. Also, the organism is easily passed from person-to-person, and for this reason is a concern in daycare settings. Frequent hand washing with soap will prevent transmission.

Who is at the greatest risk?

Those people primarily at risk of severe consequences of infection are children under five years of age and the elderly.

How widespread is the bacterium?

Preliminary estimates indicate that as many as 20,000 cases of infection from E. coli 0157:H7 occur in the United States each year. The infection is common in Canada, and is increasingly reported in Europe and Japan.



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Handout #34
Revised 01/03

Hepatitis A (Infectious Hepatitis)

Health Education Facts

What is hepatitis A?

Hepatitis A is a virus transmitted by the fecal-oral route. This means that you must get something in your mouth which is contaminated with stool from an infected person.

Who gets hepatitis A?

Most infections result from contact with a household member or sexual partner who has hepatitis A.

Sometimes infection results from eating food or drink which is contaminated with the hepatitis A virus. Once a person recovers from hepatitis A, the person is immune for life and no longer contagious.

How soon after exposure do hepatitis A symptoms appear?

On average, symptoms appear one month after exposure and may include vomiting, diarrhea, and jaundice (whites of the eyes and skin become yellowish). The contagious period lasts from two weeks before to one week after the jaundice starts.

When symptoms are experienced it is important to seek medical care. Since there are several types of hepatitis, a blood test is needed to determine which type is present. Infected children should stay home from school and day care for 10 days following the onset of illness.

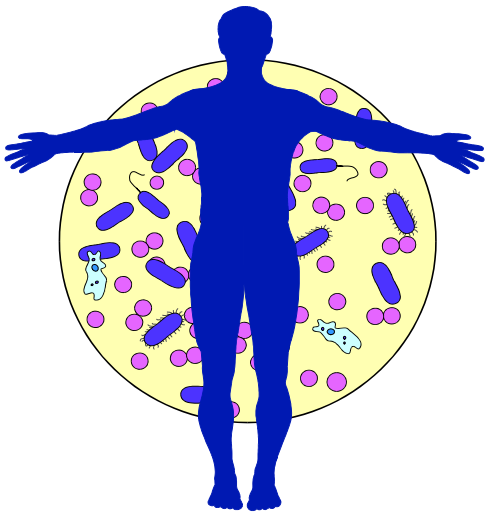
Diarrhea and vomiting can be caused by other things than hepatitis. Adults with moderate to severe gastrointestinal symptoms, particularly diarrhea lasting more than four days, should have a stool culture done through a physician or local health department.

What is the treatment for hepatitis A?

Rest and a balanced diet are usually all that is needed. There is no medication to treat hepatitis A.

How can hepatitis A be prevented?

Handwashing with soap after toileting and diapering is one effective way to prevent the spread of hepatitis A. Gamma globulin (IG) can help prevent infection, and is recommended for people who live in the same house as a person with hepatitis A, to sexual contacts of a person with hepatitis A, or to other children in the same day care center with a child with hepatitis A. IG is NOT given to casual contacts of a person with hepatitis A, such as friends or coworkers, because the risk of infection in these situations is extremely small.



Hepatitis A vaccine is recommended for travelers to countries where hepatitis A is a common infection, and for high-risk adults in this country. Hepatitis A vaccine protects the person who receives it after about one month from the date it is administered. It is not useful for people who have already been exposed to the virus.

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Handout #33
Revised 01/03

Hepatitis A (Infectious Hepatitis) and Food Handlers

Health Education Facts

What is hepatitis A?
Hepatitis A is a virus that causes liver disease. The disease is mild in children, but can be more severe in adults and can cause infected individuals to miss up to 6 weeks of work.

What are the symptoms of hepatitis A?
Symptoms often appear about one month after infection, but can develop anytime between 2 to 6 weeks after infection. Infected persons may experience fever, extreme weakness, loss of appetite, nausea, vomiting, stomach cramps, and diarrhea. These symptoms are usually followed by a few days of dark, "tea-colored" urine and jaundice (yellow skin and eyes).

How is hepatitis A spread?
The hepatitis A virus is found in the feces (stool) of infected persons. Hepatitis A virus is not spread through blood, but is spread primarily through the fecal-oral route. Infected food handlers may carry the virus on their hands and may contaminate ready-to-eat food when they do not use good handwashing practices after every restroom visit and have bare hand contact with ready-to-eat food. For the disease to spread, the virus must enter the mouth of a person who has not had hepatitis A before **or** is not immunized against hepatitis A. Good handwashing after toileting and no bare hand contact with ready-to-eat food can greatly reduce the spread of hepatitis A from an infected food handler to others.

How long can an infected person spread hepatitis A?
An infected person can spread the virus for 1 to 2 weeks before symptoms start and up to 10 days after jaundice. Therefore, an infected person may potentially shed hepatitis A virus for almost one month.

What is the treatment for hepatitis A?
There is no specific treatment for hepatitis A. Bed rest and avoiding alcohol, drugs, and over-the-counter medicines is recommended for a faster recovery. Once recovered, a person cannot spread the disease further, is immune for life and cannot be infected with hepatitis A again.

Are food handlers at higher risk for hepatitis A?
Food handlers are not at higher risk than other persons for becoming infected with hepatitis A. However, infected food handlers are at higher *public health risk* for spreading hepatitis A to others. Food handlers have the potential to infect hundreds of people if they work while infected with hepatitis A, do not use good handwashing techniques, and have bare hand contact with ready-to-eat food.

What should be done if a food handler is experiencing symptoms of hepatitis A?
If a food handler is experiencing symptoms of hepatitis A, the food handler should be excluded from food handling immediately, should seek medical care, and should not return to food handling until 2 weeks after the beginning of the illness.

What should be done for co-workers of a food handler infected with hepatitis A?
Co-workers, who worked the same days and shifts of a food handler infected with hepatitis A, should not be allowed to handle food until they receive a shot of immune globulin (IG) to help prevent hepatitis A **or** show proof of previous infection or previous vaccination. The co-workers may return to food handling if they receive IG or provide proof of immunity and are not experiencing any symptoms. If the co-workers refuse IG, they are not allowed to handle food for 50 days starting from their last contact to the infected food handler during the time when the food handler was still contagious.

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03/2004

Hepatitis A and Food Handlers (continued)

Health Education Facts

If a person receives Immune globulin (IG), is this person immune for life?

No. IG protects a person who has not been infected with hepatitis A for up to 3 months. IG provides protection if it is given before exposure to the hepatitis A virus **or** if it is given within 14 days of exposure to the virus. However, getting IG does not guarantee complete protection against hepatitis A, especially if a person has been exposed to the virus multiple times. IG may make the symptoms milder in a person already infected with hepatitis A.

Are there any health regulations for food handlers infected with hepatitis A?

Yes. To protect the public's health, food handlers infected with hepatitis A cannot handle food until 2 weeks after they started having symptoms. (K.A.R. 28-1-6.) All food handlers should also follow the Kansas Food Code 3-301.11, which prohibits bare hand contact with ready-to-eat food by any food worker.

What are the potential consequences of a food handler who works while infected with hepatitis A?

A food handler who works while infected with hepatitis A has the potential to infect hundreds of customers who have eaten food prepared by the infected worker. The risk of spreading the hepatitis A virus and other diseases increases if the infected food handler has bare hand contact with ready-to-eat food. This risk increases even more when an infected food handler has bare hand contact with ready-to-eat food and does not wash his/her hands properly after toileting. When customers have eaten food prepared by a worker infected with hepatitis A, the media is often the most efficient way of informing customers of their possible risk of and treatment options for infection with hepatitis A. This customer recall may affect a restaurant's business, reputation, and financial stability.

How can food handlers prevent the spread of hepatitis A?

1. Food handlers should never work while ill with fever, nausea, vomiting, stomach cramps, or diarrhea. If a food handler is experiencing any of these symptoms, he/she should immediately stop working, inform the manager, and seek medical care.
2. Food handlers should always use good handwashing techniques, especially after using the restroom. The proper handwashing method is the following:
   (a) Use soap and warm, running water;
   (b) Rub hands together vigorously for 20 seconds;
   (c) Wash all surfaces, including backs of hands, wrists, between fingers, tips of fingers, under fingernails;
   (d) Rinse hands well; and
   (e) Dry hands with a paper towel, if possible.
3. Food handlers should not have bare hand contact with ready-to-eat food. If gloves are used, hands must be washed before putting on gloves. Gloves should be used for only one task and then be discarded. Gloves should also be replaced with clean gloves whenever food preparation has been interrupted.
   NOTE: Glove usage does not replace the need for food handwashing practices.
4. A vaccine that protects against hepatitis A virus is available and can be used to prevent infection in food handlers.

Is there a vaccine that protects against hepatitis A?

Yes. The hepatitis A vaccine was licensed in the U.S. in June 1995 and is safe and effective for the prevention of hepatitis A. The vaccine is a two-dose series, with the second dose given 6 to 12 months after the first dose. Nearly everyone is protected one month after receiving the first dose, but a second vaccine is needed for lifelong protection.

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Listeriosis

Health Education Facts

Listeriosis is a food-borne illness caused by the bacteria Listeria monocytogenes. Although it may cause only a few or no symptoms in healthy people, it can cause serious illness in people with immune system problems, the elderly and pregnant women.

How is Listeriosis Spread?

People get listeriosis by eating food contaminated with the bacteria *L. monocytogenes*. Some types of soft cheeses, undercooked poultry, hot dogs not thoroughly reheated, foods from deli counters, and other ready-to-eat foods are responsible for most reported cases. There have been a few cases of farm workers and veterinarians who have gotten it from animals, but this is not common.

What are the Symptoms?

Healthy people with listeriosis may not have noticeable symptoms. For others, symptoms include fever, fatigue, nausea, vomiting, and diarrhea. Listeriosis, if left untreated, can lead to meningitis (brain infection) and bacteria in the bloodstream. Pregnant women may develop flu-like symptoms with complications resulting in miscarriage, stillbirth, or meningitis in their newborn baby. In older children and adults, listeriosis may attack the central nervous system and bloodstream, causing pneumonia and inflammation of the lining of the heart and valves. Abscesses or skin lesions may also appear. Although flu-like symptoms may occur 12 hours after eating contaminated food, it usually takes from one to six weeks for a serious case of listeriosis to develop. The time it takes for symptoms to appear depends on the person's age and general health, the strain of *L. monocytogenes*, and how much bacteria was eaten.

How Can Listeriosis be Prevented?

Although most people are at very low risk for listeriosis, the risk of this and other food-borne illnesses can be reduced by following the tips listed below:

- Avoid using or drinking unpasteurized milk.
- Keep raw and cooked foods separate when shopping, preparing, cooking, and storing foods. Bacteria in juices from raw meat, poultry, and fish can contaminate cooked food.
- Wash your hands, knives, and cutting boards after handling uncooked foods.
- Wash raw vegetables well before eating them.
- Thoroughly cook meats, poultry, eggs, and fish.
- Read and follow directions on foods to keep them properly refrigerated. Do not use foods after their expiration date.
- Keep hot foods hot and cold foods cold. Do not keep them unrefrigerated longer than two hours.
- Place leftovers in shallow, covered containers and refrigerated them immediately.
- Keep your refrigerator clean, and keep the temperature in it between 34 and 40°F.

Pregnant women, the elderly, and people who have weakened immune systems can reduce their risk by following the tips below:

- Avoid soft cheeses such as Mexican style (soft, white ethnic cheeses), feta, Brie, Camembert, and blue cheese. There is no need to avoid hard cheeses, processed slices, cottage cheese, or yogurt.
- Reheat leftover foods and ready-to-eat foods such as hot dogs thoroughly until they are steaming hot.
- Although the risk of listeriosis from deli counter food is relatively low, avoid these foods and thoroughly reheat cold cuts before eating them.

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Norwalk-Like Viruses

Health Education Facts

HOW COMMON ARE NORWALK-LIKE VIRUSES?

Only the common cold is reported more frequently than viral gastroenteritis as a cause of illness in the United States. Although viral gastroenteritis is caused by a number of viruses, it is estimated that Norwalk-like viruses are responsible for about 1/3 of the cases in those over 2 years of age. Norwalk-like viruses are increasingly being recognized as a leading cause of foodborne disease. Though first discovered in 1972, it wasn't until the viruses were cloned in 1990 that researchers were able to study them.

HOW ARE NORWALK-LIKE VIRUSES TRANSMITTED?

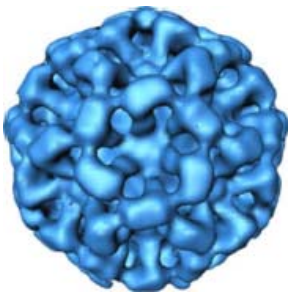
Norwalk-like gastroenteritis is usually transmitted via hands inadequately washed after toileting. The virus is then transferred to food or water. Secondary person-to-person transmission has been documented. Water is the most common source of outbreaks and may include water from municipal water supplies, wells, recreational lakes, swimming pools and water stored aboard ships. Shellfish and salad ingredients are the foods most often implicated in Norwalk-like outbreaks. Ingestion of raw or insufficiently steamed clams and oysters poses a high risk for infection. Foods other than shellfish are contaminated by ill food handlers.

WHAT ARE THE SYMPTOMS?

A mild and brief illness usually develops 24-48 hours after contaminated food or water is consumed and lasts for 24-60 hours. The disease is self-limiting, mild and characterized by nausea, vomiting, diarrhea and abdominal pain. Headache and low-grade fever may occur. Severe illness or hospitalization is very rare. Person-to-person transmission can occur up to 7 days after an affected person has stopped having symptoms.

SOME TIPS FOR PREVENTING NORWALK-LIKE VIRUS INFECTION

- Wash hands with soap and warm water after toilet visits and before preparing or eating food
- Cook all shellfish thoroughly before eating
- Wash raw vegetables before eating
- Food handlers with symptoms of Norwalk-like viruses should not prepare or touch food



Norwalk Virus Electron Micrograph

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CDC Answers Your Questions About

Noroviruses and Food Handlers

What are noroviruses?

Noroviruses are members of a group of viruses called caliciviruses also known previously as "Norwalk-like viruses." Infection with norovirus affects the stomach and intestines, causing an illness called gastroenteritis, or "stomach flu." This "stomach flu" is ***not*** related to the flu (or influenza), which is a respiratory illness caused by influenza virus. In addition, noroviruses are not related to bacteria and parasites that can cause gastrointestinal illnesses. Norovirus is not a "new" virus, but interest in it is growing as more is learned about how frequently noroviruses cause illness in people (see – "Why is norovirus infection important for food handlers?").

What are the symptoms of infection with norovirus?

Norovirus infection causes gastroenteritis, which is an inflammation of the stomach and the small and large intestines. The symptoms of gastroenteritis are nausea, vomiting, and/or diarrhea accompanied by abdominal cramps. Some people also complain of headache, fever/chills, and muscle aches. Symptoms are usually brief and last only 1 or 2 days. However, during that brief period, people can feel very ill and vomit, often violently and without warning, many times a day. Symptoms usually begin 24 to 48 hours after ingestion of the virus, but can appear as early as 12 hours after exposure (see – "How is norovirus spread?"). There is no evidence that sick persons can become long-term carriers of the virus, but the virus can be in the stool and vomit of infected persons, from the day they start to feel ill to as long as 2 weeks after they feel better.

Other infectious and non-infectious agents can cause symptoms similar to those of norovirus gastroenteritis; people who have these symptoms and have questions about the cause of their illness should consult a physician.

How serious is norovirus gastroenteritis?

Norovirus gastroenteritis is usually not a serious illness, and other than drinking liquids to prevent dehydration, there is no specific treatment. Most people recover completely within 1 to 2 days, with no long-term complications of norovirus illness. However, persons who are unable to drink enough liquids to replace those lost with vomiting and/or diarrhea may become dehydrated and require special medical attention. These people include young children, the elderly, and persons of any age unable to care for themselves.

How is norovirus spread?

Noroviruses are found in the stool or vomit of infected people. People can become infected with the virus in several ways, including:

- eating food (see food handler fact sheet) or drinking liquids that are contaminated with norovirus;
- touching surfaces or objects contaminated with norovirus, and then placing their hand in their mouth;
- having direct contact with another person who is infected and showing symptoms (for example, when caring for someone with illness, or sharing foods or eating utensils with someone who is ill).

Food and drinks can very easily become contaminated with norovirus because the virus is so small and because it probably takes fewer than 100 norovirus particles to make a person sick. Food can be contaminated either by direct contact with contaminated hands or work surfaces that are contaminated with stool or vomit, or by tiny droplets from nearby vomit that can travel through air to land on food. Although the virus cannot multiply outside of human bodies, once on food or in water, it can cause illness.

Some foods can be contaminated with norovirus ***before*** being delivered to a restaurant or store. Several outbreaks have been caused by the consumption of oysters harvested from contaminated waters. Other produce such as salads and frozen fruit may also be contaminated at source.

Why is norovirus infection important for food handlers?

People working with food who are sick with norovirus gastroenteritis are a particular risk to others, because they handle the food and drink many other people will consume. Since the virus is so small, a sick food handler can easily – without meaning to – contaminate the food he or she is handling. Many of those eating the contaminated food may become ill, causing an outbreak.

Outbreaks of norovirus gastroenteritis have taken place in restaurants, cruise ships, nursing homes, hospitals, schools, banquet halls, summer camps, and family dinners – in other words, places where often people have consumed water and/or food prepared or handled by others. It is estimated that as many as half of all food-related outbreaks of illness may be caused by norovirus. In many of these cases, sick food handlers were thought to be implicated.

What can I do to prevent norovirus gastroenteritis?

Many local and state health departments require that food handlers and preparers with gastroenteritis ***not*** work until 2 or 3 days after they feel better. In addition, because the virus continues to be present in the stool for as long as 2 to 3 weeks after the person feels better, strict hand washing after using the bathroom and before handling food items is important in preventing the spread of this virus. Food handlers who were recently sick can be given different duties in the restaurant so that they do not have to handle food (for example, working the cash register or hostessing).

People who are sick with norovirus illness can often vomit violently, without warning, and the vomit is infectious; therefore, any surfaces near the vomit should be promptly cleaned and disinfected with bleach solution and then rinsed. Furthermore, food items that may have become contaminated with norovirus should be thrown out. Linens (including clothes, towels, tablecloths, napkins) soiled to any extent with vomit or stool should be promptly washed at high temperature. Oysters should be obtained from reputable sources and appropriate documentation kept. Washing raw vegetables thoroughly before eating and appropriate disposal of sewage and soiled diapers also help to reduce the spread of norovirus and prevent illness. In small home-based catering businesses or family owned or operated restaurants, sick children and infants in diapers should be excluded from food preparation areas.

How is norovirus gastroenteritis diagnosed?

In special cases, when there is an outbreak of gastroenteritis there is a need to identify norovirus as the cause of the illness. In these cases, norovirus can often be found in stool samples of infected persons by using special tests. Sometimes blood tests looking for antibodies against norovirus are also performed, when the stool tests are inconclusive or were not done. Food handlers will often be asked for a stool sample or even a blood sample to help investigate the cause of an outbreak.

Can a person have norovirus gastroenteritis more than once?

Yes, a person can be infected with norovirus more than once in their lifetime. This is because there are many different noroviruses, and being infected with one type does not prevent infection from another type later. For this reason, it is difficult to develop a vaccine against norovirus.

Salmonella

Health Education Facts

Salmonella is a bacterium found in contaminated foods, and grows when foods are improperly handled or prepared. After consuming contaminated foods, serious intestinal problems may result.

Symptoms and treatment

Symptoms include fever, cramps, nausea, and diarrhea but may vary depending on the individual and amounts of contamination. Young children, people with special health conditions, and senior citizens are more likely to experience severe symptoms with complications. A doctor or health care worker should determine if treatment is necessary.

How is salmonella spread?

Salmonella bacteria are passed through the intestines of humans, mammals, and birds. Outbreaks of Salmonella have been traced to processed meats, undercooked poultry or poultry products, raw or lightly cooked foods containing egg or egg products (such as homemade ice cream), raw sausages, and unpasteurized milk and dairy products (including dried milk). Foods contaminated with rodent feces, or prepared with improperly cleaned utensils or work space, spread Salmonella infection. People with symptomatic Salmonella infection should not be handling foods.

Prevention

Careful food handling is necessary in controlling Salmonella infection. The bacteria grow and survive at room temperature, so proper food temperatures should be maintained. Salmonella is not killed by freezing, but will not grow rapidly below 40°F. Thawing meats and other foods in the refrigerator or cooking them while they are still frozen will lessen the chance of Salmonella infection. Foods must be thoroughly cooked to kill the bacteria.

Utensils and surfaces should be carefully washed and sanitized after uncooked foods are handled. Avoid cross contamination -- do not use the same utensils for raw foods and cooked foods without washing and sanitizing. Careful hand washing before preparing and handling food is important. Everyone should wash their hands after using the restroom and before eating. Hands should be washed immediately after handling diapers.

To avoid food borne illness:

- Wash hands often, and keep your nails trimmed and clean.
- Keep work areas clean and sanitary.
- Do not use the same utensils for raw and cooked foods without thorough washing and sanitizing.
- Thaw foods in the refrigerator, under running cold water, or as part of the cooking process.
- Keep hot foods hot and cold foods cold.
- Never let foods sit at room temperature for more than two hours.
- Never consume raw eggs or raw egg products.
- Cook poultry thoroughly.

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Shigellosis

Health Education Facts

What causes shigellosis?

Shigellosis is caused by bacteria belonging to the *Shigella.* species. These are: *Shigella dysentefiae 1, Shigella sonnei, Shigella flexneri, and Shigella boydii.*

Who gets shigellosis?

Shigellosis affects people of all ages; however, infants and the elderly are at greater risk of disease.

How is shigellosis transmitted?

Only humans carry *Shigella.* Transmission occurs by the fecal-oral route. The usual mode of transmission is through contaminated hands that transfer the bacteria to food or water. Person-to-person transmission also may occur. Flies may transmit the disease by carrying the bacteria on their legs to food. Dogs that eat human feces may transmit the disease to people, especially children.

What are the symptoms and how soon do they appear?

The incubation period ranges from 12 to 96 hours, but may be as long as one week. Symptoms usually include bloody diarrhea accompanied by fever, nausea, vomiting, abdominal cramps, and painful, involuntary contractions of the anus. Severe cases can result in death. Mild and asymptomatic cases may occur. Illness is often self-limiting lasting four to seven days, occasionally up to weeks or months.

How is shigellosis diagnosed?

Shigellosis is diagnosed by culturing the stool for the bacterium. This is done through a laboratory test.

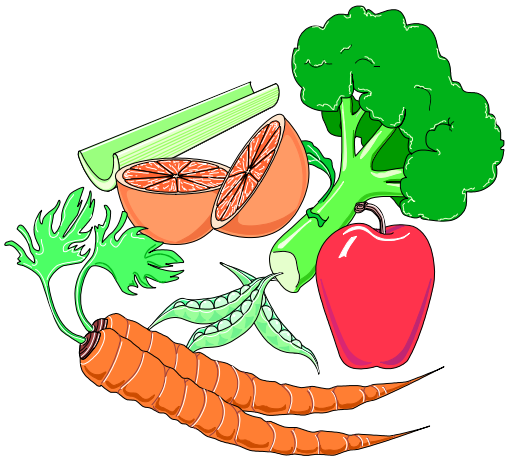
How is shigellosis treated?

Antibiotics are used to treat shigellosis and are effective in shortening the course of illness.

What can be done to prevent shigellosis?

Infection and transmission of *Shigella* can be prevented by:

- Consuming water from a safe source.
- Always washing hands after toileting, before preparing or serving meals, and before eating. Wash hands with soap for 20 seconds then rinse with warm running water.
- Washing fruits and vegetables before eating.
- Always washing hands after petting animals and changing diapers.



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